Dell® OptiPlex® G1
Managed PC Systems

SERVICE MANUAL

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Read This First

A prerequisite for using this manual to service Dell computer systems is a basic knowledge of IBM®-compatible PCs and prior training in IBM-compatible PC troubleshooting techniques. In addition to information provided in this manual and the *User's Guide* that came with the system, Dell provides the *Diagnostics and Troubleshooting Guide* for troubleshooting procedures and instructions on using the Dell diagnostics to test the computer system.

Warnings, Cautions, and Notes

Throughout this manual, there may be blocks of text printed in bold type or in italic type. These blocks are warnings, cautions, and notes, and they are used as follows:

WARNING: A WARNING indicates the potential for bodily harm and provides instructions for how to avoid the problem.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and provides instructions for how to avoid the problem.

NOTE: A NOTE provides helpful information about using the computer system.

CHAPTER 1
System Overview

This manual contains field-servicing information for the Dell® OptiPlex® G1 Managed PC family of computers. The Dell OptiPlex G1 systems are high-speed (266-, 300-, 333-, 350-, or 400-MHz), upgradable desktop computers built around high-performance Intel® Pentium® II microprocessors with MMX™ technology.

The OptiPlex G1 systems use a Dell-designed system board with an optional integrated NIC controller with Wakeup On LAN capability.

The OptiPlex G1 systems are available in three different chassis configurations: low-profile desktop, midsize desktop, and mini tower (see Figure 1-1).

Chapters 1 through 3 and Appendix A contain information that applies to all models of the OptiPlex G1 family; Chapters 4, 5, and 6 are chassis-specific.

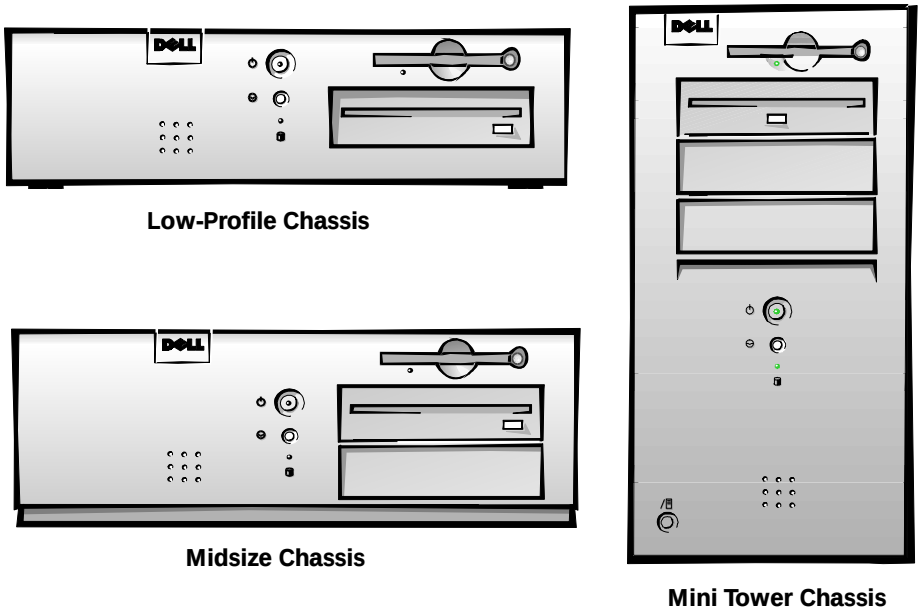


Figure 1-1. Chassis Configurations

Chassis Differences

The three OptiPlex G1 chassis configurations differ primarily in the following expansion features:

- Number of expansion slots available for PCI/ISA expansion cards
- Number of available internal drive bays for EIDE drives
- Number of available external drive bays for diskette, CD-ROM, or tape drives
- Physical size and power supply types (the midsize and mini tower systems use the same power supply)

Due to the physical differences in the three chassis configurations, a separate parts removal and replacement chapter (Chapters 4 through 6) is provided for each chassis type.

Chassis Similarities

All three chassis configurations have the following similarities:

- Same system board
- Identical operational characteristics (same BIOS, POST, memory, microprocessor, external I/O ports, and so on)
- Identical diagnostics, diagnostic beep codes, and diagnostic-screen error messages (see Chapters 1 through 3 and Appendix A)

Standard Features

The features described in the following subsections are common to all chassis configurations.

Pentium II Microprocessor

All OptiPlex G1 systems incorporate the Pentium II microprocessor for improved operating speeds and overall performance. Some of the major enhancement features of the Pentium II microprocessor include internal 16-KB data and instruction caches, internal math coprocessor, and the MMX instruction set for high performance in complex multimedia and communications environments. The Pentium II microprocessor also uses a technique called "single instruction, multiple data" (SIMD), which permits processing data elements in parallel for additional system performance enhancement.

The microprocessor is physically located in a single-edge contact (SEC) cartridge/heat sink assembly on the system board for ease of upgrading when faster processors become available. Contact Dell Computer Corporation for information about Dell-supported microprocessor upgrades.

Secondary L2 Cache

For additional performance, the OptiPlex G1 systems employ a secondary cache memory subsystem with a cache memory controller and 512 KB of pipeline-burst SRAM cache memory. The L2 cache SRAM is located in the SEC cartridge/heat sink assembly on the system board.

Main Memory

Main memory for the OptiPlex G1 systems ranges from a minimum of 32 MB to a maximum of 256 MB. All main memory is implemented using high-speed non-ECC DIMMs. One or two DIMMs, ranging in memory capacity sizes from 32 to 128 MB, may be used to provide a maximum memory capacity of 256 MB.

Upgradable BIOS in Flash Memory

The system BIOS is implemented in flash ROM, which allows for easy BIOS upgrades using diskette files or files downloaded from Dell's home page on the World Wide Web (**www.dell.com**). The BIOS also incorporates the POST diagnostics, which tests the system each time the system is started.

EIDE Subsystem

The EIDE subsystem implemented on the system board provides two Mode-4, DMA bus-mastered EIDE interfaces, each of which can support up to two EIDE devices (for example, CD-ROM drive, hard-disk drive, and so on). The EIDE controller attaches to the high-speed PCI local bus.

The primary EIDE interface (IDE1) provides support for up to two high-performance EIDE devices. The computer's boot drive should be connected to the primary EIDE interface.

The secondary EIDE interface (IDE2) also provides support for up to two high-performance EIDE devices, typically EIDE tape drives or CD-ROM drives.

NOTE: The externally accessible drive bays at the front of the computer are normally used for diskette, CD-ROM, and/or tape drives. Hard-disk drives should be installed in the internal hard-disk drive positions described in "Hard-Disk Drive Service Information" found later in this chapter.

SMART Technology

As a standard feature, OptiPlex G1 systems are equipped with Self-Monitoring and Analysis Reporting Technology (SMART), which warns you at system start-up if your hard-disk drive has become unreliable. This warning occurs only if you use hard-disk drives with SMART technology.

Integrated Diskette/Tape Drive Controller

The OptiPlex G1 systems are equipped with an integrated diskette/tape drive controller (PIIX4e) that can support a maximum of two non-EIDE diskette and tape drives via a 34-pin DSKT connector located on the system board. The low-profile chassis can accommodate only one external drive device (diskette drive or tape drive). Other chassis configurations can accommodate two external drive devices.

NOTE: If the diskette drive and tape drive are both attached to the diskette drive controller on the system board, only the diskette drive is configured in the System Setup program as Drive A or Drive B. The tape drive is then listed as Not Installed (under either the Drive A or Drive B category).

Integrated SVGA Subsystem

The OptiPlex G1 systems include an integrated high-performance 64-bit baseline accelerated graphics port (AGP) subsystem, implemented on the system board, which drives an external SVGA monitor. The AGP contains a dedicated bus that bypasses the PCI bus and allows for interconnection of the video subsystem directly to the Pentium II chip set for the extra-high performance required for 3D video subsystems. This architecture also off-loads the PCI bus providing greater performance for devices attached to the PCI bus.

The maximum supported resolutions include 1600 x 1200 pixels with 256 colors noninterlaced and 1024 x 768 pixels with 65,536 colors noninterlaced. The SVGA subsystem consists of the following major components:

- ATI Rage II C (baseline AGP 1X) video controller
- 2-MB synchronous graphics random-access memory (SGRAM) video memory (expandable to 4 MB using a video-memory upgrade kit)
- 15-hole monitor port

ATI Multimedia Channel

The ATI multimedia channel (AMC) implements a local graphics bus that allows external devices to attach directly to the graphics controller. The AMC allows devices to transfer video stream data to the graphics controller (for example, MPEG-2 decoding for digital video disk [DVD] applications), receive video stream data from the graphics controller (for example, TV-Out circuitry), or do both simultaneously. Most of the video stream data transfers occur on the AMC without congesting the PCI bus bandwidth.

The 40-pin AMC connector, shown in Figure 1-11, consists of three ports into the graphics controller: a digital video stream (DVS) port for video input into the graphics controller, a multimedia peripheral port (MPP) for video input and output from the graphic controller, and an inter-integrated circuit (I^2C)-compatible serial control port for controlling the attached devices. A fourth port, audio mixing bus (AMB), is not supported by the system. To route mixed audio from an AMC-compliant adapter card to the system board, CD-ROM audio cables must

be attached from the adapter card's CD-ROM audio input and CD-ROM audio output connections to the AMC connector. See the AMC-compliant adapter card's documentation for more information.

Chassis Intrusion Detection

The OptiPlex G1 systems provide chassis intrusion detection. If the computer cover is removed, the Chassis Intrusion setting in the System Setup program changes from Not Detected to Detected and the following message is displayed during the boot routine at system start-up:

```
Alert! Cover was previously removed.
```

To clear this field and allow future intrusions to be detected, make sure that the computer cover is closed, and then enter the System Setup program during the system's POST, as described in Appendix A, "System Setup Program." Use the left- or right-arrow key to select Reset for the Chassis Intrusion category. This action changes the setting to its default, Not Detected.

NOTE: If a setup password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

Integrated Ethernet NIC Support (Optional)

The OptiPlex G1 systems are available with or without integrated Ethernet NIC subsystem.

The integrated 10/100-Mbps 3Com® PCI 3C905B-TX Ethernet NIC subsystem supports the Wakeup On LAN feature and the 10BASE-T and 100BASE-TX standards. The NIC subsystem connects to the Ethernet network through a single RJ45 connector on the back of the computer. The RJ45 connector and the NIC interface circuitry are mounted on the system board.

The NIC connector on the computer's back panel has the following indicators:

- A yellow *activity indicator* flashes when the system is transmitting or receiving network data. (A high volume of network traffic may make this indicator appear to be in a steady "on" state.)
- A green *link integrity indicator* lights up when there is a good connection between the network and the NIC. When the green indicator is off, the system is not detecting a physical connection to the network.

Network Cable Requirements

The computer's NIC connector (RJ45) is designed for attaching to a UTP Ethernet cable. The other end of the cable connects to an RJ45 jack wall plate or to an RJ45 port on a UTP concentrator or hub, depending on the network configuration.

Chapter 4, "Using Integrated Devices," in the *Reference and Installation Guide* provides instructions for connecting the computer to, and configuring it for use on, an Ethernet network.

Full Set of I/O Ports

For desktop connectivity, the OptiPlex G1 systems include the following ports:

- 25-hole, bidirectional parallel port with EPP/ECP and demand-mode DMA support
- Two Universal Serial Bus (USB) ports
- Two 9-pin serial ports
- Two PS/2 ports (mouse and keyboard)
- One 15-hole video connector
- One RJ45 Ethernet NIC connector (optional)

See Figures 1-3 through 1-5 for I/O port identifiers for the various chassis configurations.

Power Supply

The OptiPlex G1 systems are equipped with a switch-selectable (115-/230-VAC) power supply that can operate from standard AC power outlets in the U.S. and all international countries. The power supply used in the midsize and mini tower chassis configurations is a higher-capacity model than that used in the low-profile chassis configuration.

Dell OptiPlex G1 systems have a special power supply that provides trickle ("flea") power to support the Wakeup On LAN feature when computer power is off.

Location of Major Components

Figure 1-2 shows the front-panel features for the three chassis types; Figures 1-3 through 1-5 show internal features of the three chassis types.

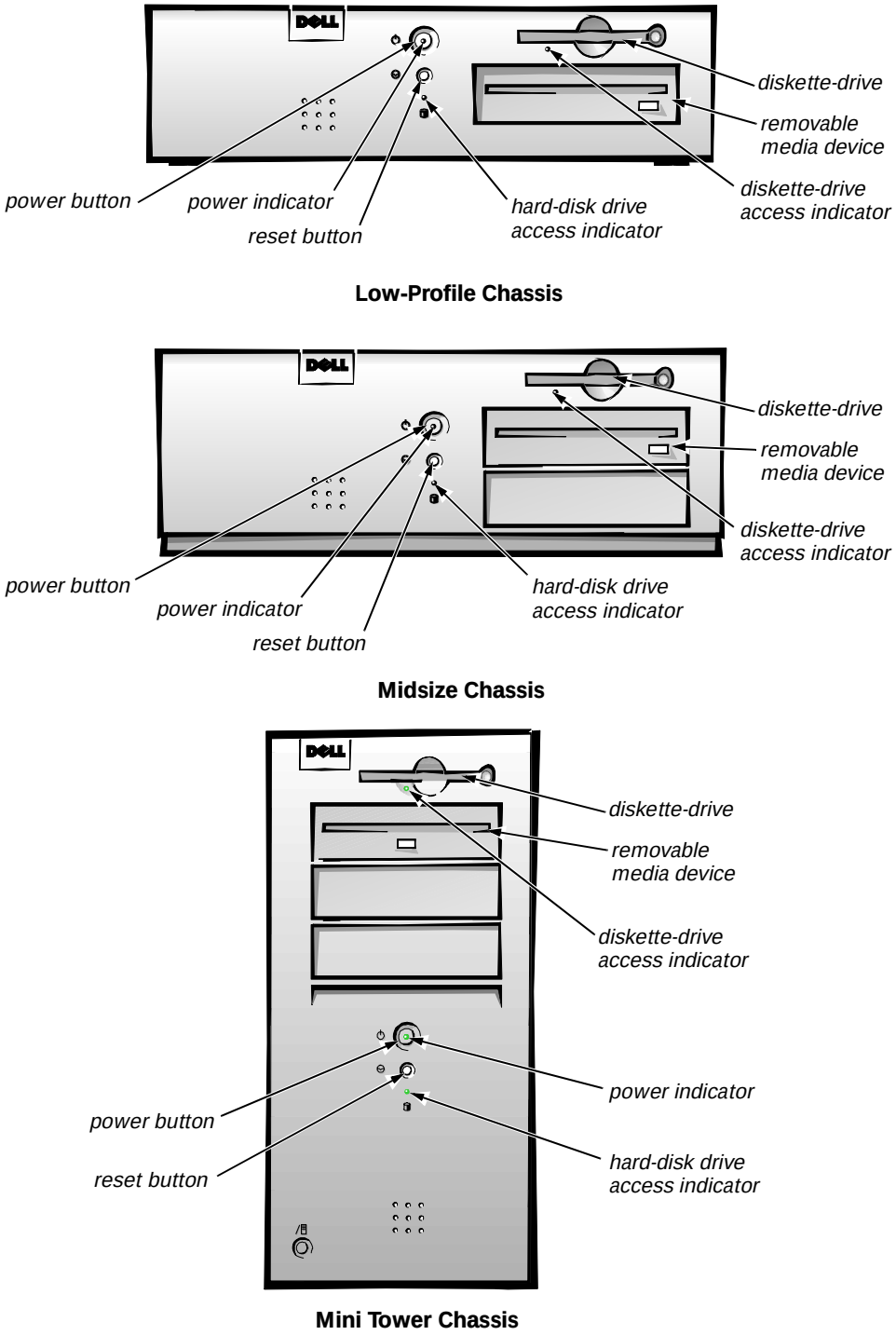


Figure 1-2. Front-Panel Features

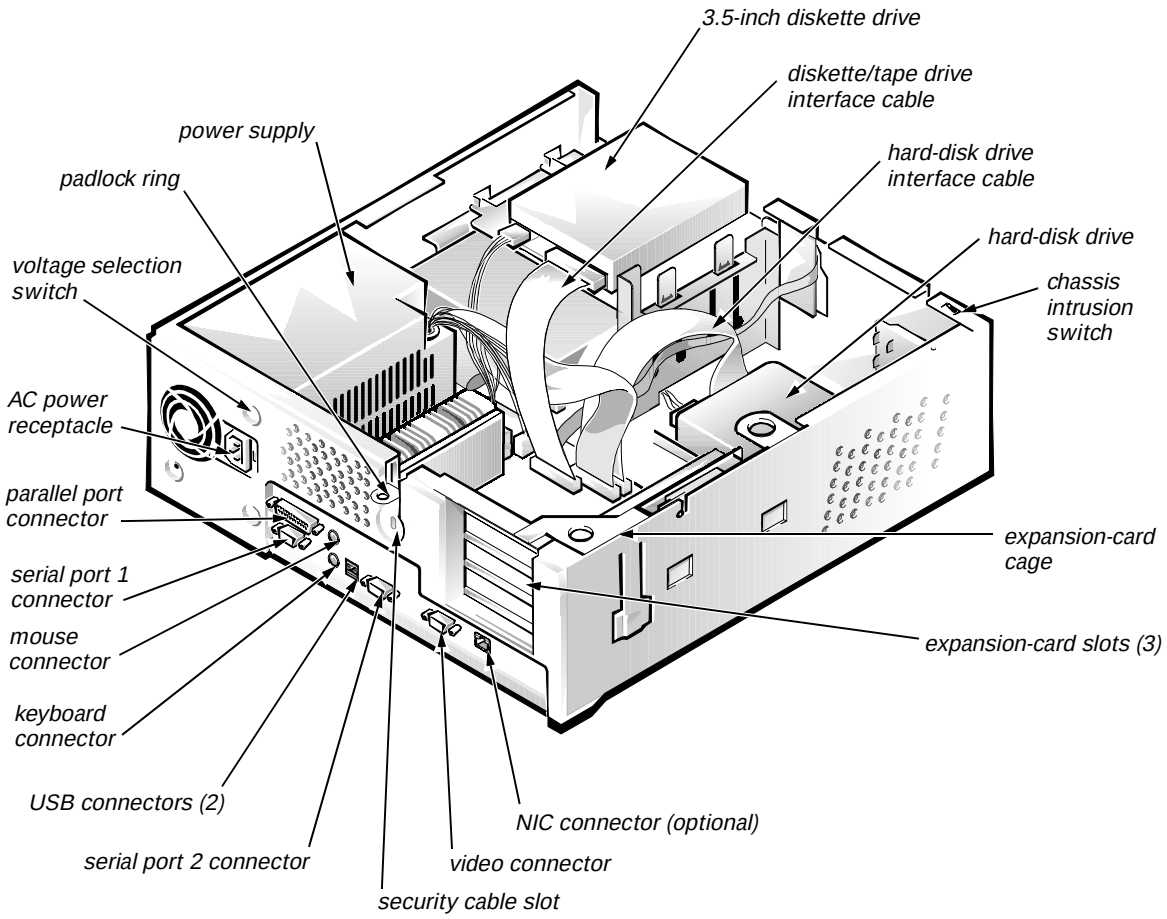


Figure 1-3. Internal View of the Low-Profile Chassis

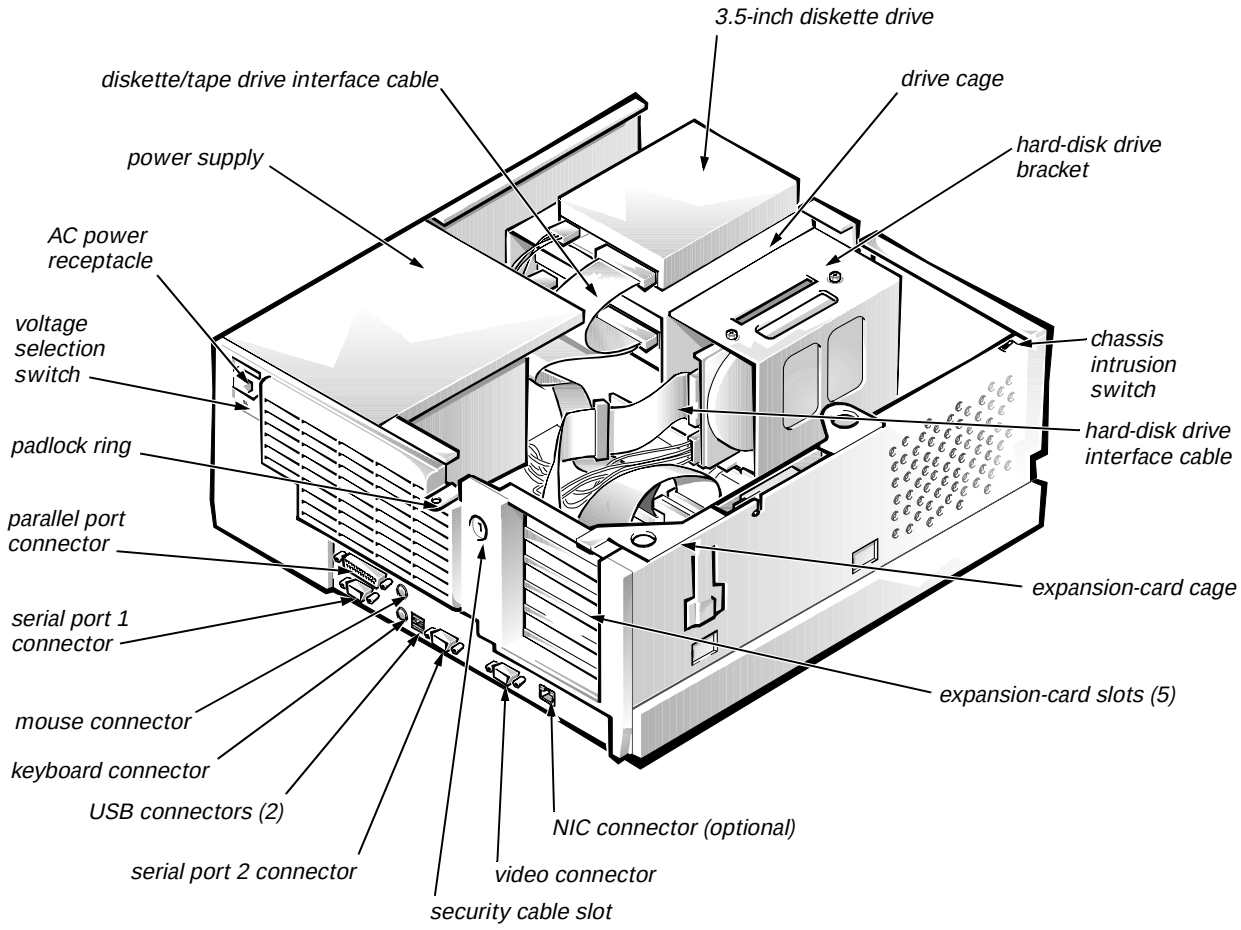


Figure 1-4. Internal View of the Midsize Chassis

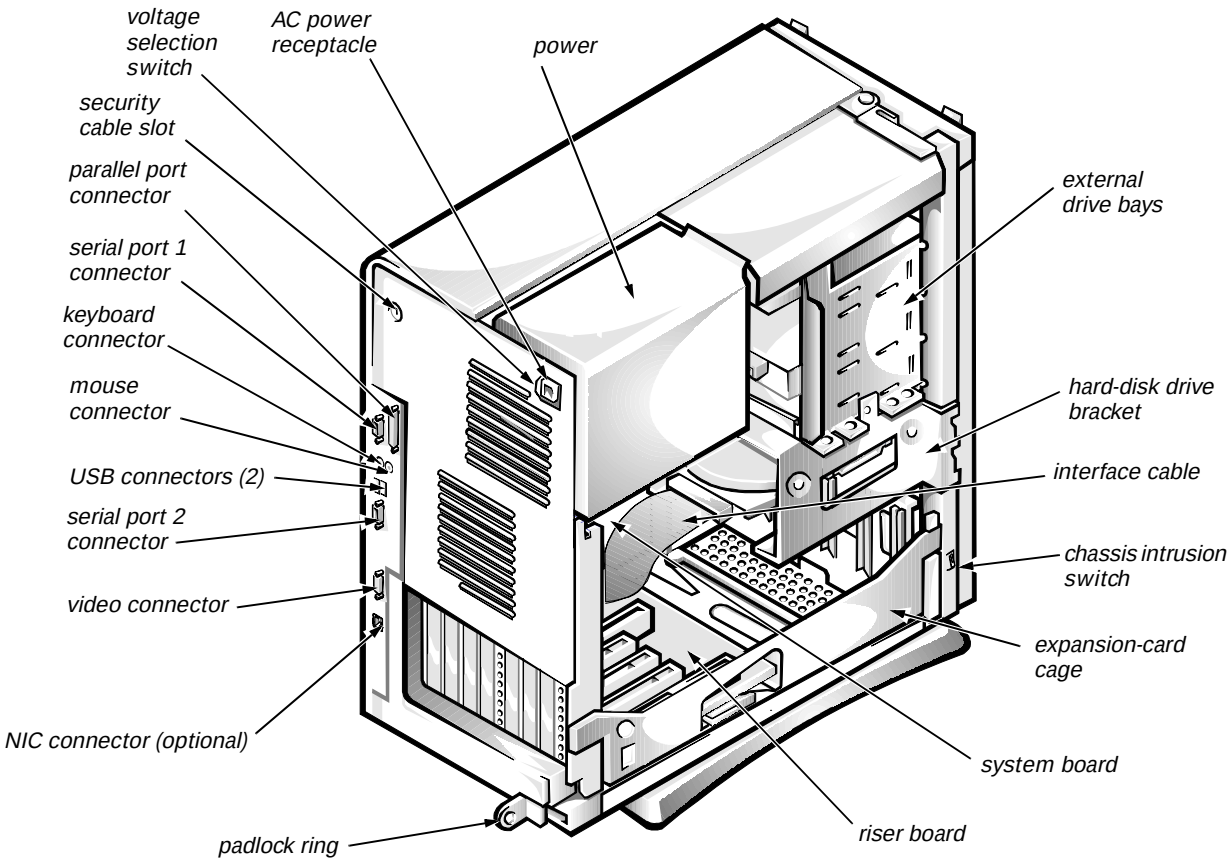


Figure 1-5. Internal View of the Mini Tower Chassis

Component Orientation

Throughout this manual, references to component locations assume the chassis orientations illustrated in Figure 1-6.

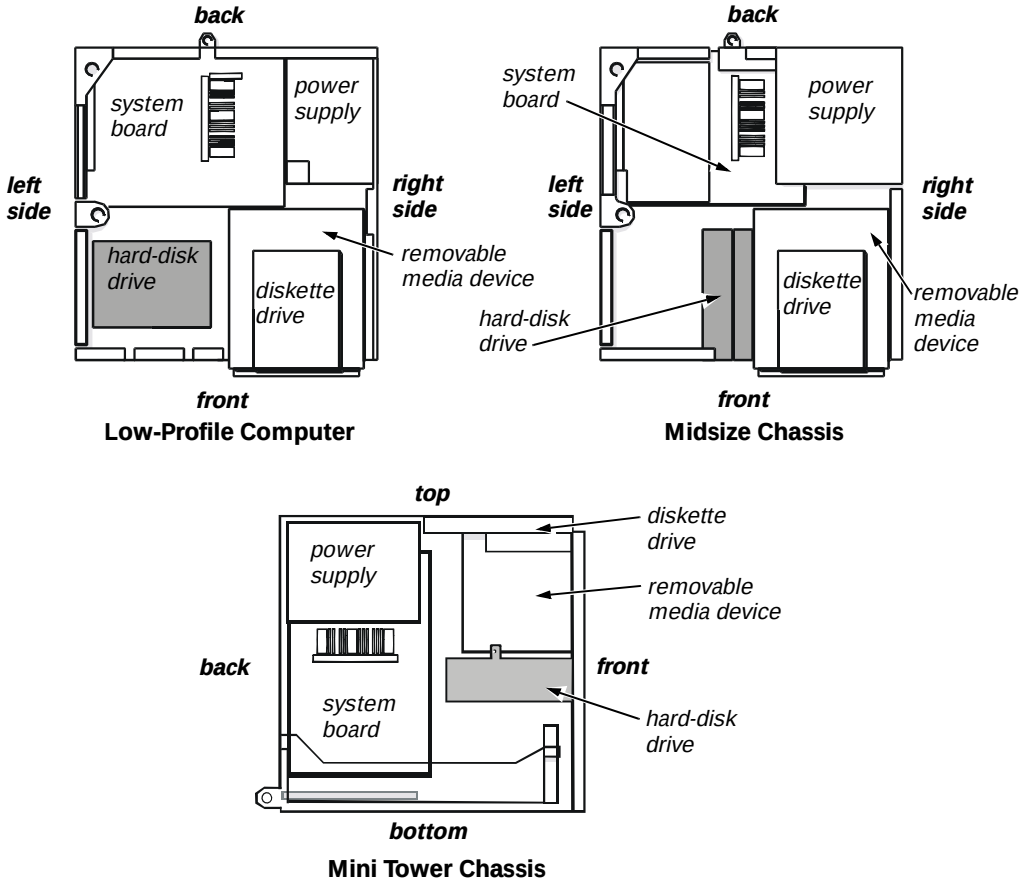


Figure 1-6. Computer Orientation Information

Advanced Expansion Features

The OptiPlex G1 systems contain advanced expansion subsystems that can support a mixture of traditional ISA expansion cards (called *legacy* cards), Plug and Play ISA expansion cards, and PCI expansion cards.

For non-Plug and Play operating system environments, an ISA Configuration Utility (ICU) included with the computer provides a means of avoiding resource conflicts. Chapter 3, "Using the ISA Configuration Utility," in the *Reference and Installation Guide* describes the ICU and provides instructions for using it to configure the computer.

In the Microsoft® Windows® 95 operating system, the functions provided by the ICU are handled by the Device Manager, which can be accessed by double-clicking the System icon in the Control Panel. See your Windows 95 documentation for instructions on using the Device Manager to manage resources and resolve conflicts.

Low-Profile Computer's Expansion-Card Slots

The OptiPlex G1 low-profile computers have three expansion-card slots. The riser board has two ISA expansion-card connectors and two PCI expansion-card connectors. One PCI expansion-card connector and one ISA expansion-card connector share a single expansion-card slot, resulting in a total of three expansion-card slots (see Figure 1-6). The low-profile computers have a passive riser board, with no PCI-to-PCI bridge.

The riser board includes the P1 connector (for connecting the NIC to the riser board cable) and an LED (see Figure 1-6). If the LED is on, the riser board is receiving power; if off, the riser board is not receiving power.

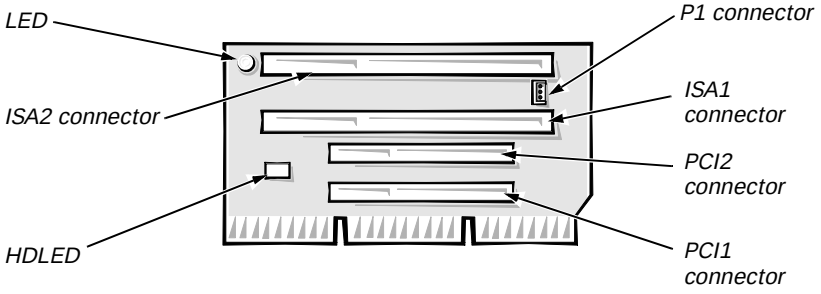


Figure 1-7. Riser Board for the Low-Profile Computer

Midsize Computer's Expansion-Card Slots

The OptiPlex G1 midsize computers have five expansion-card slots. The riser board is offered in two options. Option 1 is a passive riser board, with no PCI-to-PCI bridge. Option 1 has three ISA expansion-card connectors and three PCI expansion-card connectors. One PCI expansion-card connector and one ISA expansion-card connector share a single expansion-card slot, resulting in a total of five expansion-card slots (see Figure 1-7). Option 2 is an active riser

board, with a PCI-to-PCI bridge. Option 2 has two ISA expansion-card connectors and five PCI expansion-card connectors. Two PCI/ISA expansion-card connector pairs each share an expansion-card slot, again resulting in a total of five expansion-card slots (see Figure 1-8).

Both riser board options include the P1 connector (for connecting the NIC to the riser board cable) and an LED. If the LED is on, the riser board is receiving power; if off, the riser board is not receiving power.

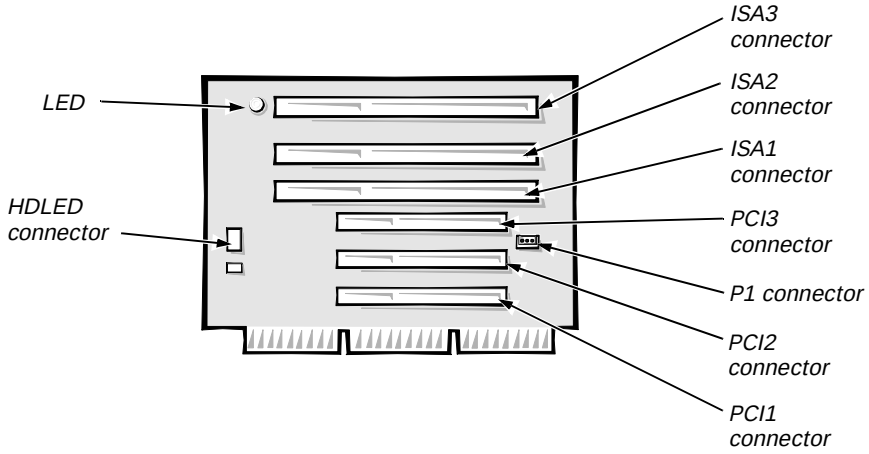


Figure 1-8. Riser Board for the Midsize Computer (Option 1)

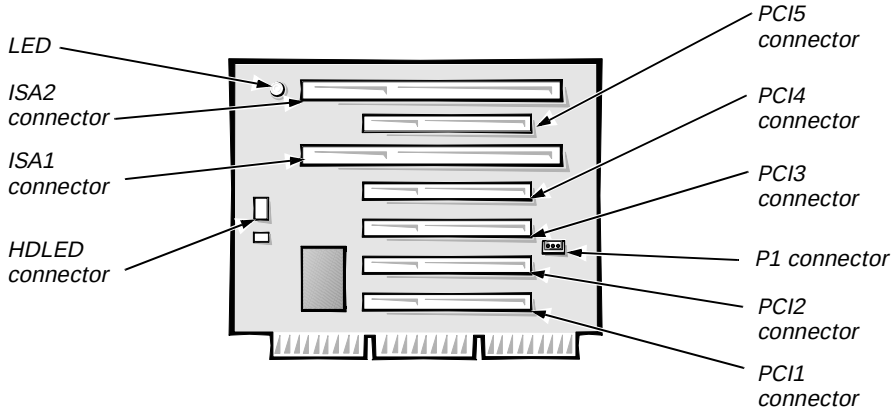


Figure 1-9. Riser Board for the Midsize Computer (Option 2)

Mini Tower Computer's Expansion-Card Slots

The mini tower computers have seven expansion-card slots. The riser board has four ISA expansion-card connectors and five PCI expansion-card connectors. Two PCI expansion-card connectors share expansion-card slots with two ISA connectors, resulting in a total of seven expansion-card slots (see Figure 1-9). The riser board is active, incorporating PCI-to-PCI bridging.

The mini tower riser board includes the P1 connector (for connecting the NIC to the riser board cable) and an LED. If the LED is on, the riser board is receiving power; if off, the riser board is not receiving power.

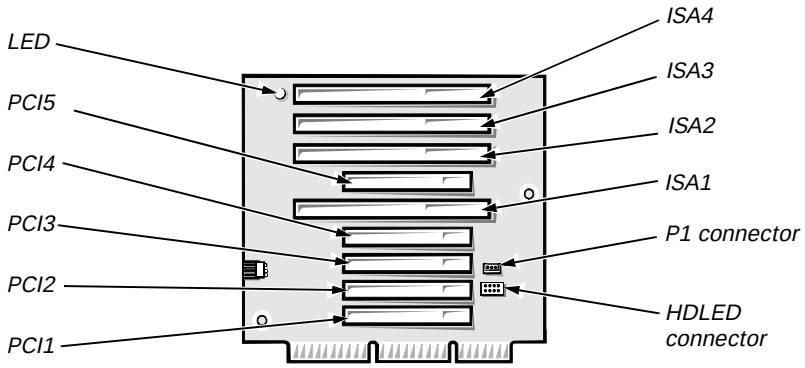


Figure 1-10. Riser Board for the Mini Tower Computer

Upgrade Options

The system board can accommodate the following system upgrades:

- Microprocessor upgrade
- Main memory expansion
- Video memory expansion

These upgrades are summarized in the following subsections, and installation procedures are provided for the various chassis configurations in Chapters 4, 5, and 6.

Microprocessor/L2 Cache Upgrades

The microprocessor and secondary L2 cache memory are implemented in an SEC cartridge/heat sink assembly. Upgrade to a higher-performance microprocessor is accomplished by snapping out the old assembly and installing an upgrade assembly as higher-performance microprocessors become available.

Main Memory Expansion

The two DIMM sockets on the system board can accommodate combinations of 32-, 64-, and 128-MB, 64-bit nonparity DIMMs, up to a total memory capacity of 256 MB.

Video-Memory Upgrade Option

You can upgrade video memory from 2 to 4 MB by installing an optional video-memory upgrade module in the video-memory upgrade socket on the system board. Adding video memory increases the system's video performance and provides additional modes for high-resolution/expanded color applications.

NOTE: See the online System User's Guide *or Chapter 6, "Installing System Board Options," in the* Reference and Installation Guide *for additional upgrade information.*

Computer Service Information

The following subsections provide service-related information about the computer. Unless otherwise specified, the information applies to all chassis configurations.

Remote Management Support Features (Optional)

For OptiPlex G1 systems equipped with the optional integrated Wakeup On LAN-capable NIC, the following tasks may be performed by a system administrator at a remote location:

- Perform computer setup processes
- Download and install software
- Perform file updates
- Perform asset-tracking functions
- Download and run the diagnostics over the network

Online Documentation

Dell OptiPlex G1 computers are shipped with an online *System User's Guide* (located in the Dell Accessories folder) that provides additional hardware and software installation, configuration information, and Dell contact information.

System Diagnostics

Server-based and diskette-based diagnostics are available to aid in troubleshooting all major components of the three Dell OptiPlex G1 chassis. See "Running the System Diagnostics" in Chapter 2 for additional information.

System-Board Service Data

The following subsections provide service-related information about the system board and components.

System Board

The OptiPlex G1 systems are equipped with a standard system board (integrated NIC is optional).

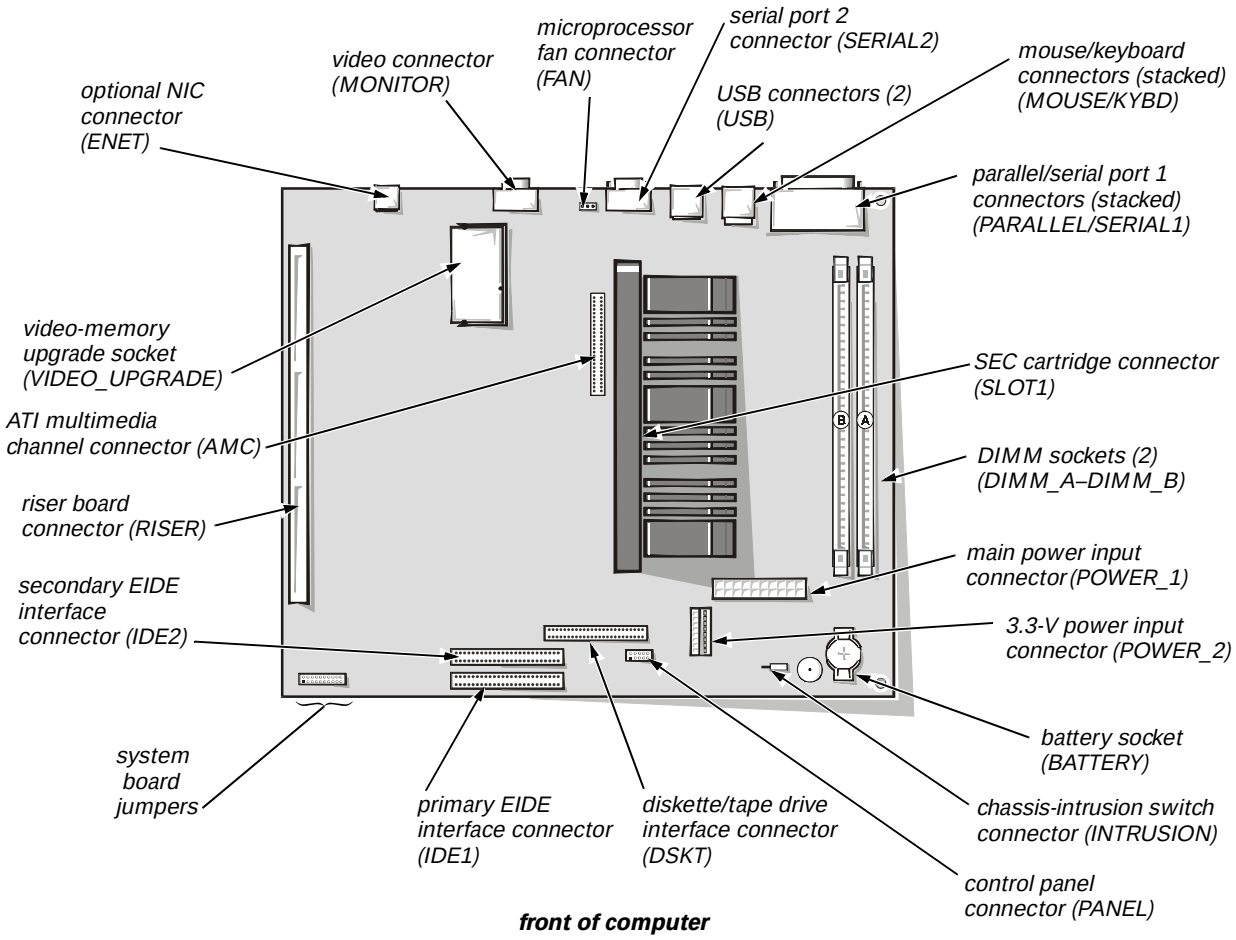

optional NIC connector (ENET)
video connector (MONITOR)
microprocessor fan connector (FAN)
serial port 2 connector (SERIAL2)
USB connectors (2) (USB)
mouse/keyboard connectors (stacked) (MOUSE/KYBD)
parallel/serial port 1 connectors (stacked) (PARALLEL/SERIAL1)
video-memory upgrade socket (VIDEO_UPGRADE)
ATI multimedia channel connector (AMC)
riser board connector (RISER)
secondary EIDE interface connector (IDE2)
SEC cartridge connector (SLOT1)
DIMM sockets (2) (DIMM_A–DIMM_B)
main power input connector (POWER_1)
3.3-V power input connector (POWER_2)
battery socket (BATTERY)
chassis-intrusion switch connector (INTRUSION)
control panel connector (PANEL)
system board jumpers
primary EIDE interface connector (IDE1)
diskette/tape drive interface connector (DSKT)
front of computer

Figure 1-11. System Board Components

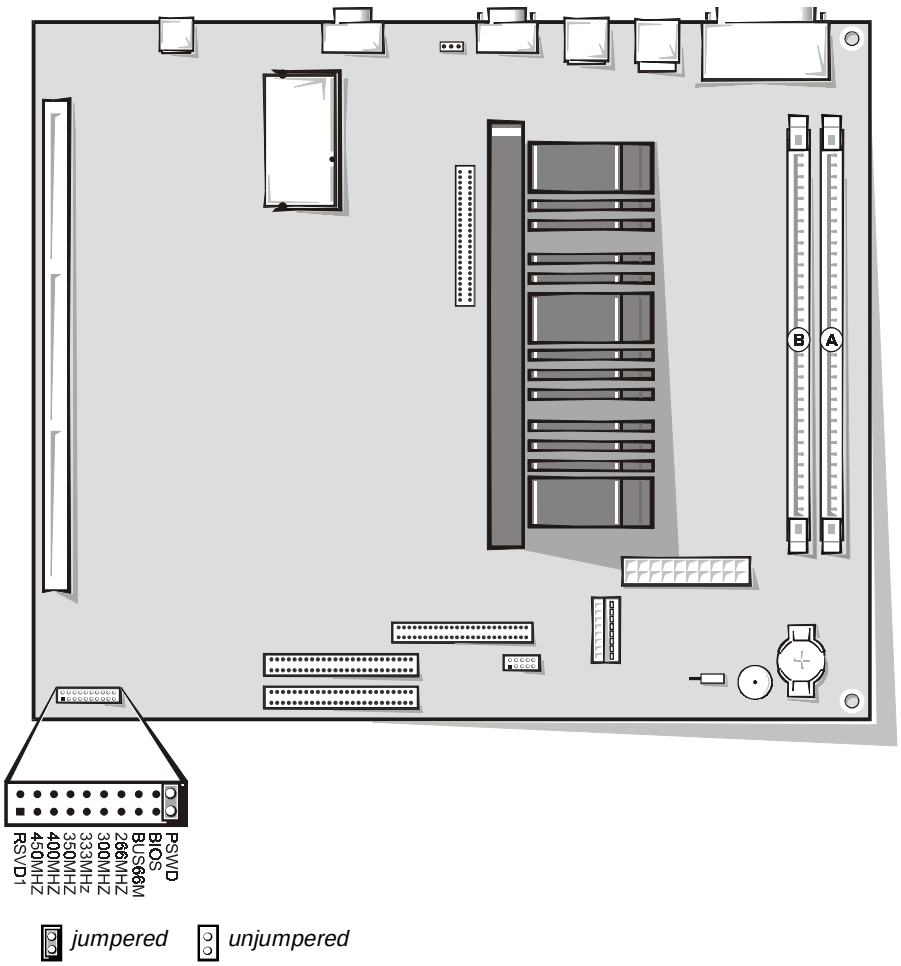


Figure 1-12. System Board Jumpers

Table 1-1. System-Board Jumper Descriptions

Jumper	Description	Settings
RSVD1	Reserved	Jumper not installed (default).
450MHZ*	Micro-processor speed	Install jumper if the microprocessor's internal speed is 450 MHz; otherwise, the jumper should not be installed.
400MHZ*	Micro-processor speed	Install jumper if the microprocessor's internal speed is 400 MHz; otherwise, the jumper should not be installed.
350MHZ*	Micro-processor speed	Install jumper if the microprocessor's internal speed is 350 MHz; otherwise, the jumper should not be installed.

* *One set of speed jumpers must have a jumper plug installed; otherwise, the system defaults to an undetermined speed.*

Table 1-1. System-Board Jumper Descriptions *(continued)*

Jumper	Description	Settings
333MHZ*	Micro-processor speed	Install jumper if the microprocessor's internal speed is 333 MHz; otherwise, the jumper should not be installed.
300MHZ*	Micro-processor speed	Install jumper if the microprocessor's internal speed is 300 MHz; otherwise, the jumper should not be installed.
266MHZ*	Micro-processor speed	Install jumper if the microprocessor's internal speed is 266 MHz; otherwise, the jumper should not be installed.
BUS66M	External system clock	Install jumper to set the external system clock speed at 66 MHz; otherwise, the external system clock speed operates at 100 MHz (default).
BIOS	Reserved	Jumper not installed (default).
PSWD	Password enable or disable	Install to enable the password feature (default).

* *One set of speed jumpers must have a jumper plug installed; otherwise, the system defaults to an undetermined speed.*

Interrupt Assignments

Table 1-2. Interrupt Assignments

IRQ Line	Used By/Available
IRQ0	Generated by system timer.
IRQ1	Generated by keyboard controller.
IRQ2	Generated internally by interrupt controller to enable IRQ8 through IRQ15.
IRQ3	Generated by super I/O controller to indicate that the device connected to the serial port (COM2 or COM4) requires service.
IRQ4	Generated by super I/O controller to indicate that the device connected to the serial port (COM1 or COM3) requires service.
IRQ5	Available for use by an expansion card.
IRQ6	Generated by super I/O controller to indicate that diskette or tape drive requires service.
IRQ7	Generated by super I/O controller to indicate that device connected to parallel port requires service.

Table 1-2. Interrupt Assignments *(continued)*

IRQ Line	Used By/Available
IRQ8	Generated by RTC alarm event.
IRQ9	Available for use by an expansion card.
IRQ10	Available for use by an expansion card.
IRQ11*	NIC/default PCI IRQ.
IRQ12	Generated by keyboard controller to indicate that mouse's output buffer is full.
IRQ13	Generated by math coprocessor to indicate coprocessor error.
IRQ14	Generated by device connected to primary EIDE port to indicate that device requires service. If the EIDE controller is disabled, this line is available for other use.
IRQ15	Generated by device connected to secondary EIDE port to indicate that device requires service. If the EIDE controller is disabled, this line is available for other use.

* *If an ISA expansion card is configured for IRQ11, the optional NIC or PCI IRQ is assigned to another available IRQ line.*

DMA Channel Assignments

Table 1-3. DREQ Line Assignments

DREQ Line	Used By/Available
DREQ0	Available
DREQ1	Available
DREQ2	Generated by super I/O controller to initiate DMA cycle for attached diskette drive
DREQ3	Available
DREQ4	Generated by bus controller chip to activate second DMA controller
DREQ5	Available
DREQ6	Available
DREQ7	Available

NOTE: The built-in audio controller, NIC (optional), and video controllers are assigned available DMA channels automatically during system start-up.

Hard-Disk Drive Service Information

The following subsections provide service-related information about hard-disk drive options for the OptiPlex G1 computers.

Hard-Disk Drive for the Low-Profile Computer

The hard-disk drive assembly (consisting of the hard-disk drive and the hard-disk drive bracket) is located inside the chassis at the left front of the computer and is attached to the bottom of the chassis. One 1-inch-high EIDE hard-disk drive can be mounted on the hard-disk drive bracket.

Hard-Disk Drive for the Midsize Computer

The hard-disk drive bracket is located next to the externally accessible drive bays at the front of the computer. The hard-disk drive bracket can contain either one or two 1-inch-high EIDE hard-disk drives, or one 1-inch-high EIDE hard-disk drive and one 1.6-inch-high EIDE hard-disk drive.

Hard-Disk Drive for the Mini Tower Computer

The hard-disk drive bracket is located beneath the externally accessible drive bays at the front of the computer. The hard-disk drive bracket can contain either one or two 1-inch-high EIDE hard-disk drives, or one 1-inch-high EIDE hard-disk drive and one 1.6-inch-high EIDE hard-disk drive.

Power-Supply Service Data

The low-profile computers have a 145-W system power supply, and the midsize and mini tower computers have a 200-W system power supply. All system power supplies can operate from an AC power source of 115 VAC at 50 to 60 Hz or 230 VAC at 50 to 60 Hz.

WARNING: The voltage selection switch, located on the back of the power supply assembly, must be set to the correct operating voltage (115 or 230 V) before you plug the power cable into an AC outlet.

The system power supply provides the DC operating voltages and currents listed in Table 1-4.

NOTE: The power supply produces DC voltages only under its loaded condition. Therefore, when you measure these voltages, the DC power input connectors must be connected to their corresponding power input connectors on the system board or drives.

Table 1-4. OptiPlex G1 DC Voltage Ranges

Voltage	Range	Maximum Output Current
+3.3 VDC	+3.15 to +3.45 VDC	12.0 A[1] (low-profile computers); 14.0 A[1] (midsize and mini tower computers)
+5 VDC	+4.75 to +5.25 VDC	18.0 A[1] (low-profile computers); 22.0 A[1] (midsize and mini tower computers)
+12 VDC	+11.40 to +12.60 VDC	3.0 A[2] (low-profile computers); 6.0 A[2] (midsize and mini tower computers)
–12 VDC	–10.80 to –13.20 VDC	0.3 A (low-profile computers); 0.3 A (midsize and mini tower computers)
–5 VDC	–4.50 to –5.50 VDC	0.3 A (low-profile computers); 0.3 A (midsize and mini tower computers)
+5 VFP[3]	+4.75 to +5.25 VDC	10 mA

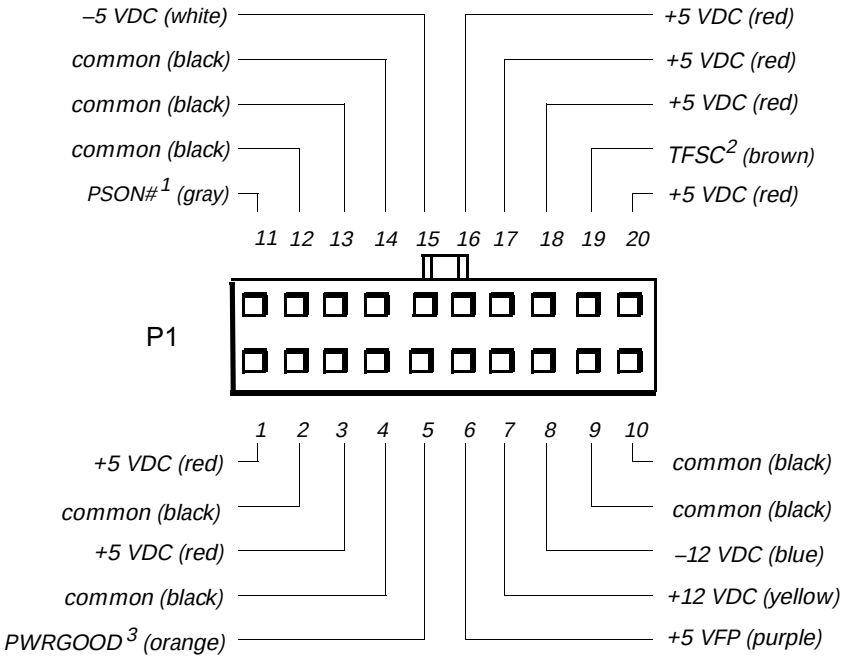
1 *The combined load on the +5-VDC and +3.3-VDC outputs should not exceed 105 W on the low-profile computers or 140 W on the midsize/mini tower computers.*

2 *Withstands surges of up to 11.0 A to support disk start-up operations.*

3 *VFP (volts flea power) — sometimes called "standby power."*

Pin Assignments for the DC Power Connectors

The power-supply output voltages can be measured at the back (wire side) of the connectors without disconnecting them. Figures 1-15 through 1-17 show the wire side of the connectors.



1 *Pin 11 — PSON# should measure between +4 and +5 VDC except when the power button on the front panel is pressed, taking PSON# to its active-low state.*

2 *Pin 19 — Thermal fan-speed control (TFSC) is a power-supply input signal used to control the power-supply fan speed.*

3 *Pin 5 — PWRGOOD should measure between +4 and +5 VDC when the power supply is on and operating to indicate that all power-supply output voltages are within ranges specified in Table 1-4.*

Figure 1-13. DC Power Connector P1

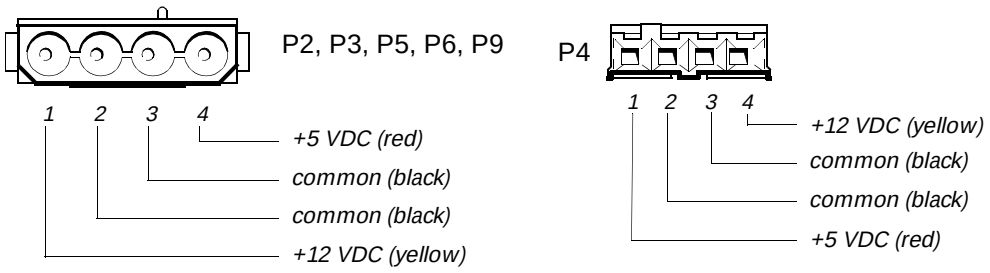


Figure 1-14. DC Power Connectors P2 (Midsize and Mini Tower Chassis); P3, P4, P5, P6, and P9 (All OptiPlex G1 Chassis)

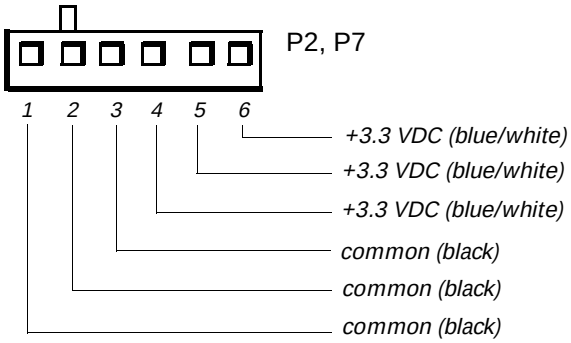


Figure 1-15. DC Power Connectors P2 (Low-Profile Chassis) and P7 (All OptiPlex G1 Chassis)

DC Power Distribution

Figures 1-18 through 1-20 provide the following information about DC power distribution:

- Power-supply connector identification
- Power cable connections for diskette, tape, CD-ROM, and hard-disk drives
- Power distribution to sockets and connectors on the system board

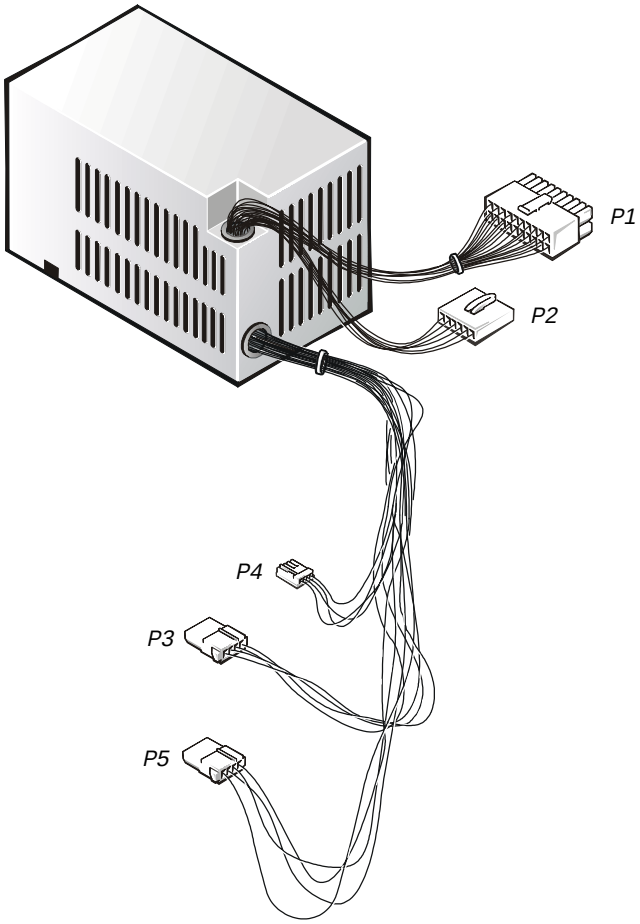


Figure 1-16. DC Power Cables for the Low-Profile Computer

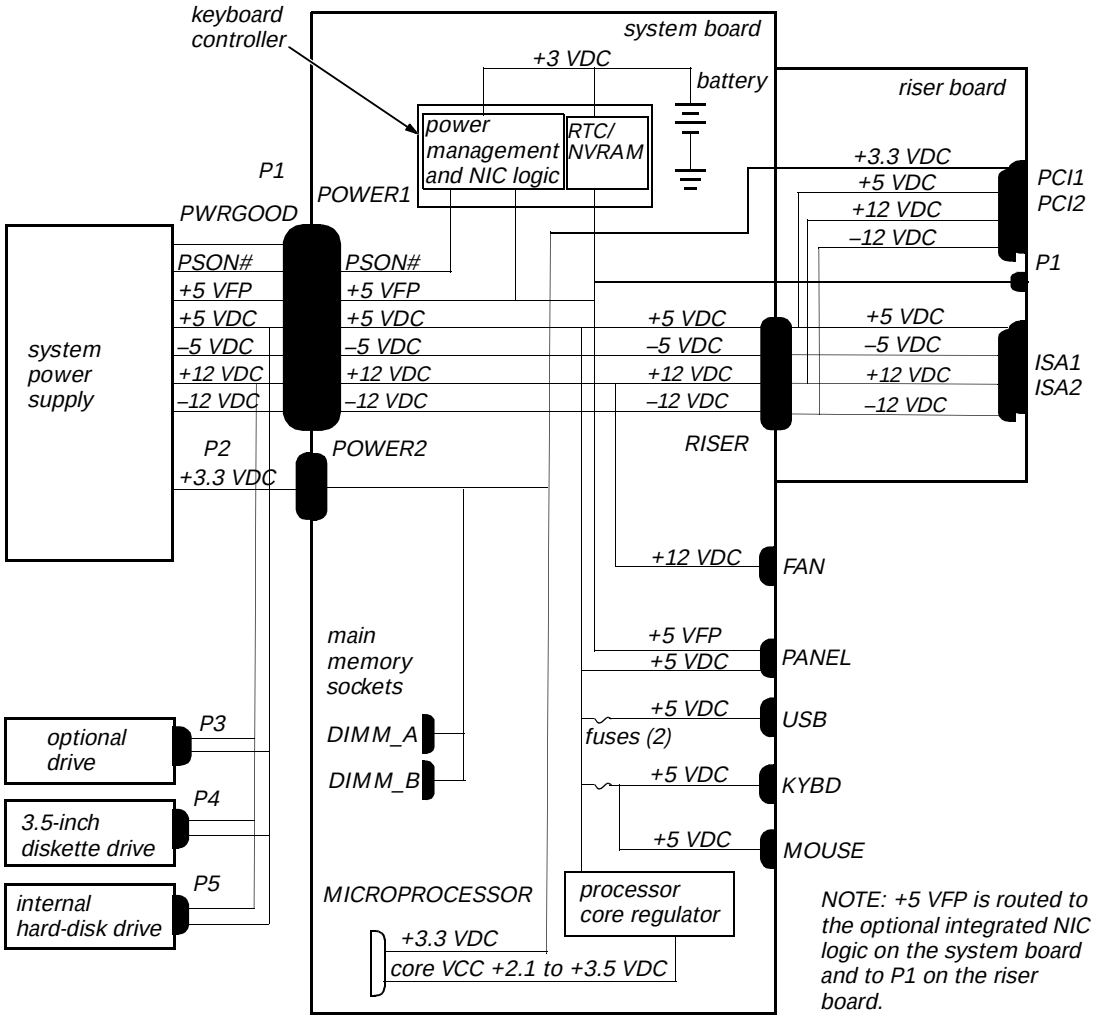


Figure 1-17. DC Power Distribution for the Low-Profile Computer

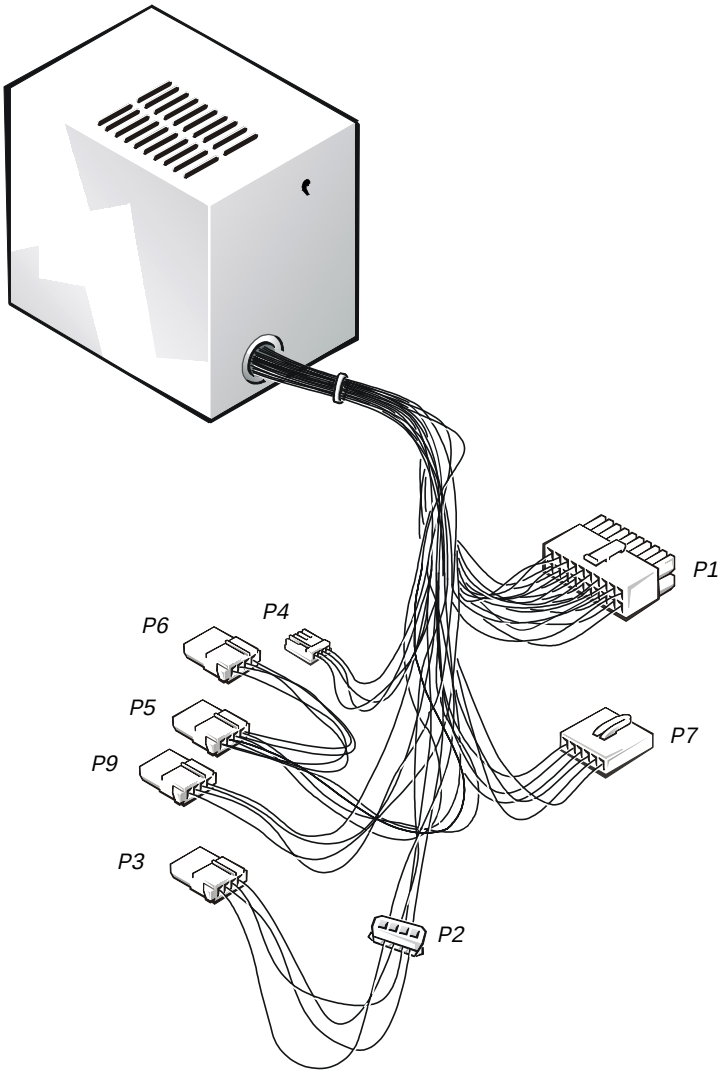
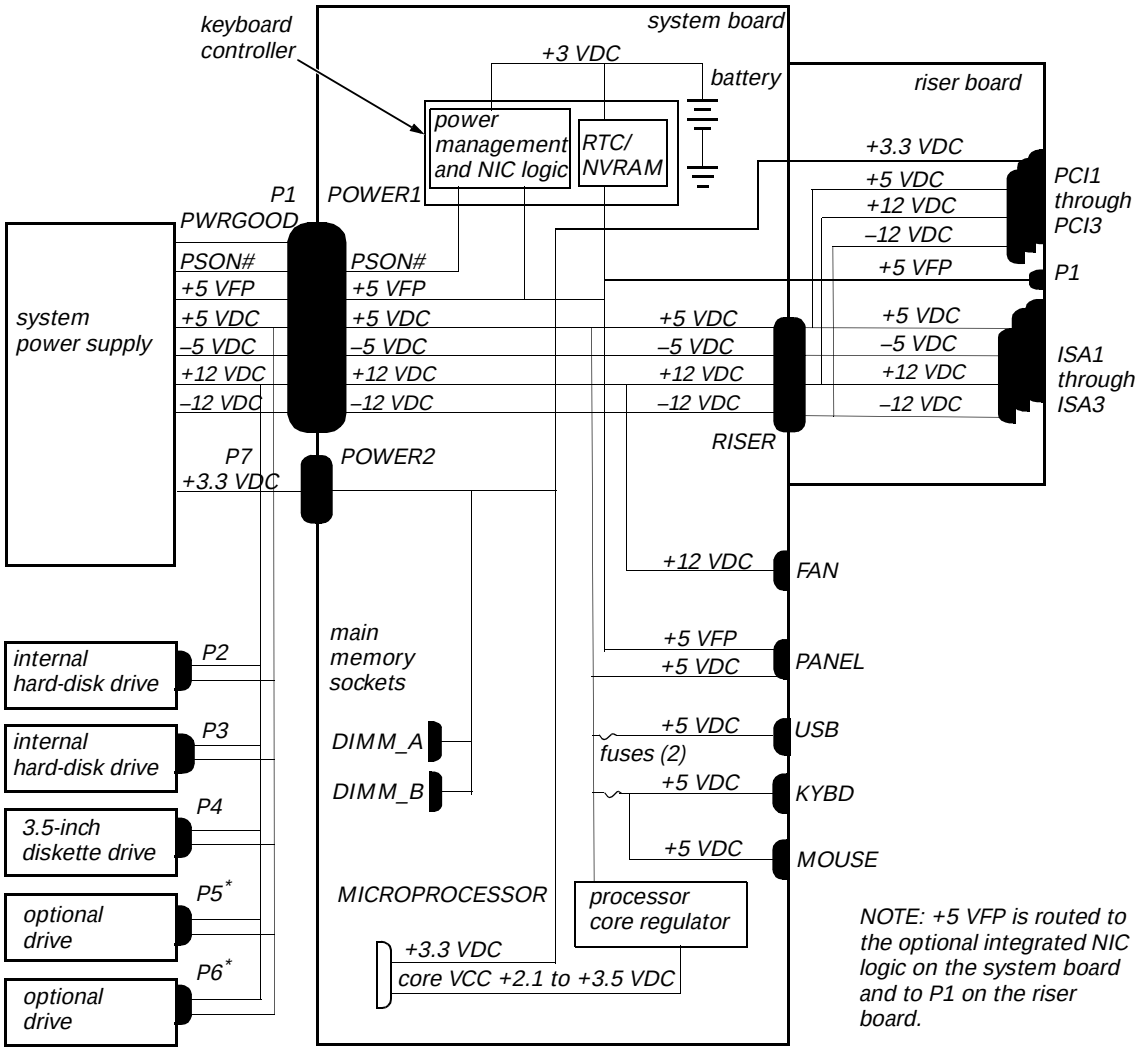


Figure 1-18. DC Power Cables for the Midsize and Mini Tower Computers



* Some computers have an additional connector (P9) that may be used instead of P5 or P6.

Figure 1-19. DC Power Distribution for the Midsize Computer

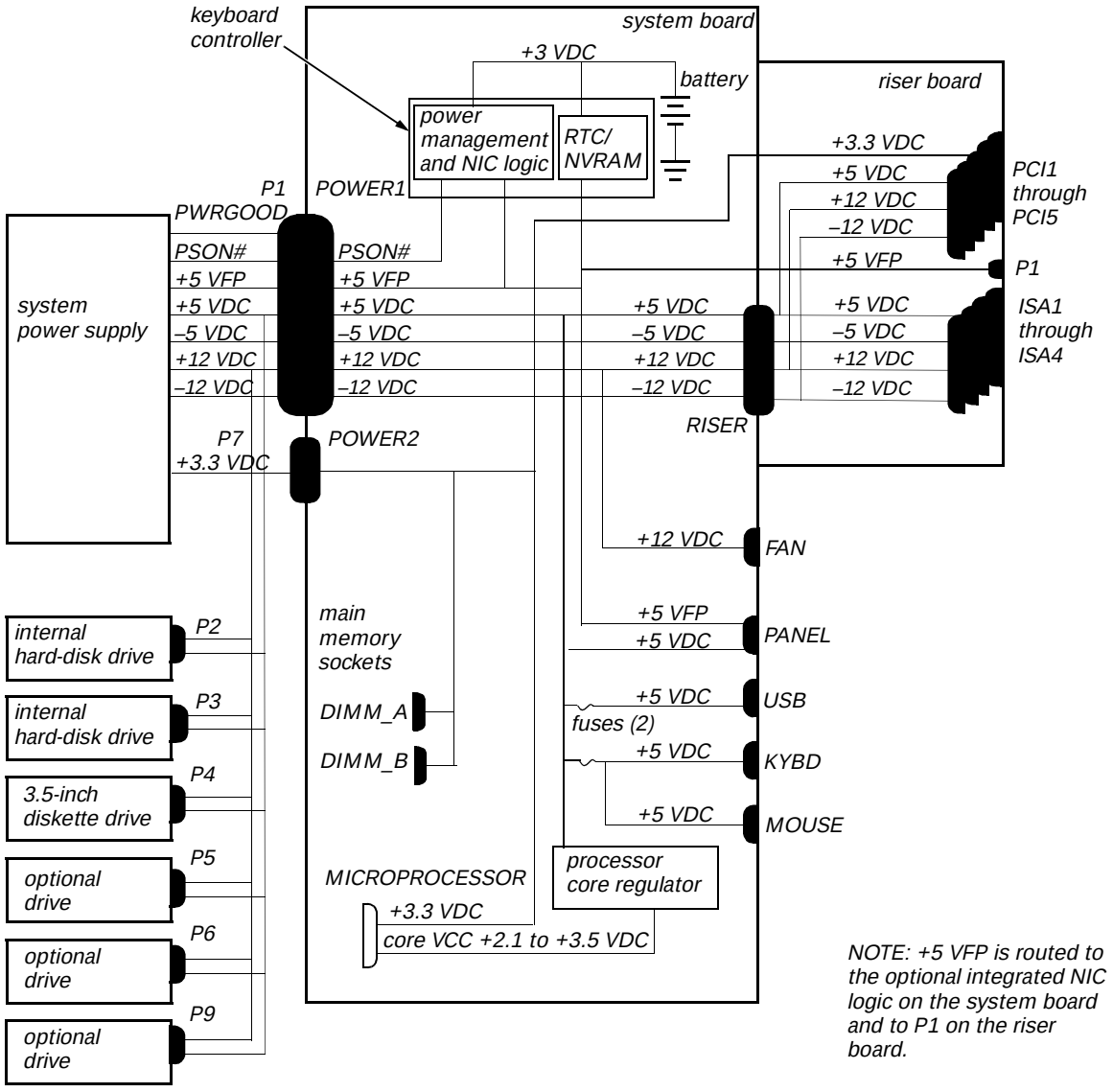


Figure 1-20. DC Power Distribution for the Mini Tower Computer

Technical Specifications

Table 1-5. Technical Specifications

Microprocessor	
Microprocessor type	Intel Pentium II microprocessor with MMX technology
Microprocessor speed	266, 300, 333, 350, or 400 MHz
External system clock	66/100 MHz
Internal cache	32-KB (16-KB data cache and 16-KB instruction cache)
Math coprocessor	internal to the microprocessor
System Information	
System chip set	Intel 440BX PIIX4e chip set
Data bus width	64 bits
Address bus width	32 bits
DMA channels	eight
Interrupt levels	15
Flash EPROM (BIOS)	2 Mb
Expansion Bus	
Bus types	PCI and ISA (PCI bus complies with PCI Specification 2.1)
Bus speeds	PCI: 33 MHz; ISA: 8.33 MHz
PCI expansion-card connectors:	
Low-profile computers	two (one PCI connector and one ISA connector share an expansion-card slot)
Midsize computers	three (one PCI connector and one ISA connector share an expansion-card slot) *or* five (two share expansion-card slots)
Mini tower computers	five (two PCI connectors share expansion-card slots with ISA connectors)

Table 1-5. Technical Specifications *(continued)*

Expansion Bus *(continued)*	
ISA expansion-card connectors:	
Low-profile computers	two (one ISA connector and one PCI connector share an expansion-card slot)
Midsize computers	three (one ISA connector and one PCI connector share an expansion-card slot) *or* two (both share expansion-card slots)
Mini tower computers	four (two ISA connectors share expansion-card slots with PCI connectors)
NIC	
NIC.	optional integrated 3Com PCI 3C905B-TX Wakeup On LAN Ethernet NIC, operating at 10 or 100 Mbps
Memory	
Architecture	64-bit (nonparity), noninterleaved
DIMM sockets	two (gold contacts)
DIMM capacities	32-, 64-, and 128-MB SDRAM
Minimum RAM	32 MB
Maximum RAM	256 MB
L2 cache memory	512-KB pipeline-burst, four-way set-associative, write-back SRAM
BIOS address.	F0000h
NIC ROM address	C8000h
Drives	
Externally accessible bays:	
Low-profile computers	one 3.5-inch bay for a 3.5-inch diskette drive; one 5.25-inch bay for a removable media device
Midsize computers	one 3.5-inch bay for a 3.5-inch diskette drive; two 5.25-inch bays for removable media devices
Mini tower computers	one 3.5-inch bay for a 3.5-inch diskette drive; three 5.25-inch bays for removable media devices

Table 1-5. Technical Specifications *(continued)*

Drives *(continued)*	
Internal hard-disk drive bays:	
Low-profile computers	one bay for a 1-inch-high EIDE hard-disk drive
Midsize computers	two bays for either one or two 1-inch-high EIDE hard-disk drives, or one 1-inch-high EIDE hard-disk drive and one 1.6-inch-high EIDE hard-disk drive
Mini tower computers	two bays for either one or two 1-inch-high EIDE hard-disk drives, or one 1-inch-high EIDE hard-disk drive and one 1.6-inch-high EIDE hard-disk drive
Video	
Video type	integrated ATI Rage II C (baseline AGP 1X) graphics
Video memory	2-MB SGRAM, upgradable to 4 MB
Maximum video resolution	1600 x 1200 pixels, with 256 colors
Ports	
Externally accessible:	
Serial (DTE)	two 9-pin connectors (16550-compatible)
Parallel	one 25-hole connector (bidirectional)
Video	one 15-hole connector
PS/2-style keyboard	6-pin mini-DIN
PS/2-compatible mouse	6-pin mini-DIN
NIC (optional)	RJ45 connector
USB	two USB-compliant connectors
Internally accessible:	
EIDE hard-disk drive	two 40-pin connectors on PCI local bus
Diskette drive	34-pin connector
ATI multimedia	40-pin connector

Table 1-5. Technical Specifications *(continued)*

Key Combinations	
<Ctrl><Alt><Del>.	restarts (reboots) the system
<F2>	starts System Setup program (during the POST only)
<Ctrl><Alt><\>	toggles microprocessor speeds on 101-key keyboard (in MS-DOS® real mode only)
<Ctrl><Alt><#>.	toggles microprocessor speeds on 102-key keyboard (in MS-DOS real mode only)
Controls and Indicators	
Reset control	push button
Power control.	push button
Power indicator	green LED in normal operation; flashing green LED in sleep state; green LED on riser board
Diskette-drive access indicator	green LED
Hard-disk drive access indicator	green LED
Link integrity indicator (on systems with NIC connector)	green LED
Activity indicator (on systems with NIC connector).	yellow LED
Power	
Power supply wattage:	
Low-profile computers	145 W
Midsize computers	200 W
Mini tower computers	200 W
Power-supply heat dissipation:	
Low-profile computers	808 BTU (nominal)
Midsize computers	913 BTU (nominal)
Mini tower computers	913 BTU (nominal)

Table 1-5. Technical Specifications *(continued)*

Power *(continued)*	
Power supply voltage	90 to 135 V at 60 Hz; 180 to 265 V at 50 Hz
Backup battery	3-V CR2032 coin cell
Physical	
Low-profile computers:	
Height	10.9 cm (4.3 inches)
Width	40.89 cm (16.1 inches)
Depth	43.69 cm (17.2 inches)
Weight (minimum)	10.89 kg (24.0 lb)
Midsize computers:	
Height	16.5 cm (6.5 inches)
Width	41.9 cm (16.5 inches)
Depth	44.5 cm (17.5 inches)
Weight (minimum)	12.7 kg (28.0 lb)
Mini tower computers:	
Height	44.4 cm (17.5 inches)
Width	20.6 cm (8.1 inches)
Depth	43.7 cm (17.2 inches)
Weight (minimum)	14.9 kg (33.0 lb)
Environmental	
Temperature:	
Operating	10° to 35°C * (50° to 95°F)
Storage	–40° to 65°C (–40° to 149°F)
Relative humidity	20% to 80% (noncondensing)
Maximum vibration:	
Operating	0.25 G at 3 to 200 Hz at 1 octave/min
Storage	0.5 G at 3 to 200 Hz at 1 octave/min

* *The maximum operating temperature of 35°C (95°F) is for altitudes below 914.6 m (3000 ft). Above 914.6 m (3000 ft), the maximum operating temperature is reduced.*

Table 1-5. Technical Specifications *(continued)*

Environmental *(continued)*	
Maximum shock:	
Operating	left side (for low-profile and midsize computers operating in a vertical orientation) and bottom half-sine pulse with a change in velocity of 50.8 cm/sec (20 inches/sec)
Storage	27-G faired square wave with a velocity change of 508 cm/sec (200 inches/sec)
Altitude:	
Operating	–16 to 3048 m * (–50 to 10,000 ft)
Storage	–16 to 10,600 m (–50 to 35,000 ft)

* *The maximum operating temperature of 35°C (95°F) is for altitudes below 914.6 m (3000 ft). Above 914.6 m (3000 ft), the maximum operating temperature is reduced.*

CHAPTER 2
Basic Troubleshooting

This chapter provides basic troubleshooting procedures applicable to all systems of the Dell OptiPlex G1 Managed PC family. A brief explanation of how to load and start the system diagnostics is also provided at the end of the chapter. Dell recommends that you perform the following procedures in the order they are presented in this manual. Chapter 3, "Beep Codes and Error Messages," also contains information to assist you in diagnosing computer failures that occur during the POST.

Initial User Contact

When you first contact a user who has a problem, ask the user to describe the problem and the conditions under which it occurs. In particular, was the user installing new hardware or software when the failure occurred? A verbal description can often indicate the cause of a problem or indicate the appropriate troubleshooting procedure to use. After the user describes the problem, follow these steps:

1. **Ask the user to back up any data on the hard-disk drive if the system's condition permits.**

   See "Maintaining the System" in the online *System User's Guide* for information about backing up data.

2. **Ask the user to try to duplicate the problem by repeating the operations he or she was performing at the time the problem occurred.**

   Can the user duplicate the problem?

   Yes. Proceed to step 3.

   No. Proceed to the next section, "External Visual Inspection."

3. **Observe the user to determine if he or she is making an error, such as typing an incorrect key combination or entering a command incorrectly.**

   Is the problem a result of user error?

   Yes. Instruct the user in the proper procedure, or direct him or her to the appropriate user documentation for the correct procedure.

   No. Proceed to the next section, "External Visual Inspection."

External Visual Inspection

The external visual inspection consists of a quick inspection of the exterior of the computer, the monitor, the keyboard, any peripherals, and cables. While performing the visual inspection, make any necessary corrections. To perform the external visual inspection, follow these steps:

1. **Turn off the computer, the monitor, and all peripherals.**

2. **Verify that all power cables are properly connected to the computer, the monitor and peripherals, and their power sources.**

3. **Verify that the keyboard and mouse interface cables are firmly attached to the proper connectors on the back of the computer.**

   For a PS/2-compatible mouse, the keyboard and mouse interface cable connectors are identical except for their labels. For a serial mouse, the mouse interface cable must be firmly attached to one of the serial port connectors, and its captive screws must be secure enough to ensure a firm connection.

4. **Verify that any devices attached to the serial and parallel port connectors are properly connected.**

   Each of the serial and parallel port interface cables must be firmly attached to an appropriate connector on the back of the computer as well as to the interface connector on the device. The captive screws that secure these connectors at each end of the interface cable must be secure enough to ensure a firm connection.

5. **Verify that the video interface cable is firmly attached to the video connector on the back of the computer and to the connector on the back of the monitor.**

   For proper connection of the video monitor, see the documentation for the monitor.

6. **Inspect all external monitor controls for any obvious damage or improper settings.**

   For proper settings of the video monitor controls, see the documentation for the monitor.

7. **Inspect the keyboard to ensure that no keys are sticking.**

   If one or more keys are sticking, it may be necessary to replace the keyboard.

8. **Inspect the exterior of the computer, including all controls and indicators, and all user-accessible data storage devices for any signs of physical damage.**

   Does the inspection reveal any problems?

   Yes. Refer to the parts removal and replacement procedure in Chapters 4, 5, or 6, as appropriate for your system.

   No. Proceed to the next section, "Observing the Boot Routine."

Observing the Boot Routine

After you have performed an external visual inspection as described in the previous section, you should boot the system and, while the boot routine is running, observe the system for any indications of problems.

CAUTION: To prevent damage to the original diagnostics diskette, always use a backup copy of the diagnostics diskette when servicing a user's computer. Dell recommends that users make several copies of the original diskette to ensure that one is always available.

NOTE: Most of the steps in this procedure require observation of system functions and indications, some of which can occur simultaneously. It may be necessary to reboot the system several times in order to complete all of these steps.

To observe problem indications during the boot routine, follow these steps:

1. **Insert a copy of the *Dell Diagnostics Diskette* into drive A. Turn on all peripherals and the computer. If the computer is already on, press the reset button or <Ctrl><Alt><Del> to reboot the system.**

2. **Check the power supply fan.**

   Does the fan run normally?

   Yes. Proceed to step 3.

   No. Troubleshoot the system power supply.

3. **Watch the Num Lock, Caps Lock, and Scroll Lock indicators on the upper-right corner of the keyboard. After all three indicators flash momentarily, the Num Lock indicator should light up and remain on.**

   Do these indicators flash on and off within approximately 10 seconds after the boot routine starts?

   Yes. Proceed to step 4.

   No. Troubleshoot the system power supply. If the troubleshooting procedure indicates that the system power supply is operational, troubleshoot the system board.

4. **During the boot routine, observe the system for any of the following:**

   - *Diskette-drive and hard-disk drive access indicators*: These indicators light up in response to data being transferred to or from the drives. If either of these indicators fails to light up during the boot routine, troubleshoot the diskette drive or hard-disk drive subsystem, as appropriate.
   - *System error messages*: These messages can indicate problems or provide status information. If a system error message is displayed, see Table 3-2.
   - *Beep codes*: A beep code is a series of beeps that indicates an error condition. If the system emits a beep code, see Table 3-1.

5. **Observe the monitor screen for the Diagnostics Menu.**

   Does the Diagnostics Menu appear?

   Yes. See "Running the System Diagnostics" found later in this chapter.

   No. Proceed to step 6.

6. **Turn off the system, insert a copy of the *Dell Diagnostics Diskette* into the diskette drive, and then reboot the system.**

   Does the Diagnostics Menu appear?

   Yes. See "Running the System Diagnostics" found later in this chapter.

   No. Proceed to the next section, "Internal Visual Inspection."

Internal Visual Inspection

CAUTION: Before you proceed with the internal visual inspection described in this section, ensure that the user has saved all open files and exited all open applications, if possible.

A simple visual inspection of a computer's interior hardware can often lead to the source of a problem, such as a loose expansion card, cable connector, or mounting screw. When you perform the visual inspection, refer to Figures 1-3 through 1-5, as appropriate for your system, for component location information.

To perform the internal visual inspection, follow these steps:

1. **Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.**

2. **Remove the computer cover.**

3. **Verify that all chips, DIMMs, and expansion cards are fully seated in their sockets or connectors.**

WARNING: The single-edge contact (SEC) cartridge/heat sink assembly can get extremely hot. Be sure that the assembly has had sufficient time to cool before you touch it.

While reseating the SEC cartridge/heat sink assembly, use a wrist grounding strap or maintain contact with a metal surface on the chassis.

The microprocessor is physically located in a SEC cartridge/heat sink assembly on the system board. To reseat the microprocessor, remove the SEC cartridge/heat sink assembly and reinstall it as described in "SEC Cartridge/Heat Sink Assembly" in Chapter 4, 5, or 6, as appropriate for your system.

To reseat a DIMM, remove it from its socket and reinstall it as described in "DIMMs" in Chapter 4, 5, or 6, as appropriate for your system.

If you need to reseat an expansion card, remove it from its connector and reinstall it as described in "Expansion Cards" in Chapter 4, 5, or 6, as appropriate for your system.

4. **Verify that all jumpers are set correctly.**

   For information about these jumpers, see "System Board Jumpers" in Chapter 1.

5. **Check all cable connectors inside the computer to verify that they are firmly attached to their appropriate connectors.**

6. **Reinstall the computer cover.**

7. **Reconnect the computer and any attached peripherals to their power sources, and turn them on.**

   Does the problem appear to be resolved?

   Yes. No further steps are necessary. Terminate the procedure.

   No. Proceed to the next sections, "Eliminating Resource Conflicts," "Running the System Diagnostics," and "Getting Help."

Eliminating Resource Conflicts

Devices within the computer may require dedicated memory spaces, interrupt levels, or DMA channels, all of which must be allocated during installation of the devices. Because a device may be installed at a different time, it is possible that the same resource is assigned to two or more devices.

Resource conflicts can result in disorderly or erratic system operation or failure of the system to operate at all. If you suspect that resource conflicts might exist, check the system and reassign the resources as necessary.

Running the System Diagnostics

The OptiPlex G1 systems use diskette-based diagnostics, which contain tests to aid in troubleshooting all major components of the system.

CAUTION: To prevent damage to the original diagnostics diskette, always use a backup copy of the diagnostics diskette when servicing a user's computer. Dell recommends that users make several copies of the original diskette to ensure that one is always available.

To run the diskette-based diagnostics, follow these steps:

1. **Insert a copy of the *Dell Diagnostics Diskette* into the diskette drive. Turn on all peripherals and the computer.**

   Starting the diagnostics causes the Dell logo to appear on the monitor screen, followed by a message indicating that the diagnostics is loading. Before the diagnostics loads, a program tests the portion of main memory (RAM) required for loading the diagnostics. If a main memory error is detected, a message indicates which DIMM has failed. If no errors are found in main memory, the diagnostics loads and the Diagnostics Menu appears.

2. **Observe the monitor screen for the Diagnostics Menu.**

   This menu lets you choose the following options or exit to the MS-DOS prompt:

   - Run Quick Tests — Runs selected tests from all test groups to quickly locate a failure or to indicate where further testing is needed to isolate a failure
   - Run All Tests — Runs all tests for a thorough test of the system
   - Run Specific Tests — Tests a particular area or subsystem

   If the Diagnostics Menu does not appear, check the diskette drive connections, insert a copy of the diagnostics diskette into the diskette drive, and reboot the system. If the Diagnostics Menu still does not appear, proceed to the next section, "Getting Help."

For a complete description of the diskette-based diagnostics, see "Diskette-Based Diagnostics" in the online *Network Administrator's Guide.*

Getting Help

If none of the troubleshooting procedures in this chapter or the tests in the server-based, hard-disk–based, or diskette-based diagnostics reveals the source of the problem or leads to the proper troubleshooting steps for determining the source of the problem, call Dell for technical assistance. For instructions, see "Contacting Dell" in the online *System User's Guide.*

CHAPTER 3
Beep Codes and Error Messages

This chapter describes the beep codes and error messages that are common to all members of the Dell OptiPlex G1 Managed PC family of computers. These error messages can occur during the POST or, in the case of some failures, during normal system operation. The tables in this chapter list faults that can cause a beep code or system error message to occur and the probable causes of the fault in each case.

If a faulty system does not emit beep codes or display system error messages to indicate a failure, you should use the system diagnostics to run the appropriate tests to help isolate the source of the problem (see "Running the System Diagnostics" in Chapter 2).

POST Beep Codes

If the monitor cannot display error messages during the POST, the system may emit a series of beeps that identifies the problem or that can help you identify a faulty component or assembly. Table 3-1 lists the beep codes that may be generated during the POST. Most beep codes indicate a fatal error that prevents the system from completing the boot routine until the indicated condition is corrected.

When the system emits a beep code, record the code and then find it in Table 3-1. If the table does not lead to the source of the problem, run the appropriate tests in the system diagnostics to assist in troubleshooting the problem.

Table 3-1. POST Beep Codes

Beep Code	Error	Probable Causes
1-1-3	NVRAM write/read failure	Defective system board
1-1-4	BIOS checksum failure	Faulty BIOS or defective system board
1-2-1	Programmable interval-timer failure	Defective system board
1-2-2	DMA initialization failure	
1-2-3	DMA page register write/ read failure	

Table 3-1. POST Beep Codes *(continued)*

Beep Code	Error	Probable Causes
1-3-1	Main-memory refresh verification failure	Faulty or improperly seated DIMM or defective system board
1-3-2	No memory installed	No memory installed or faulty or improperly seated DIMM
1-3-3	Chip or data line failure in the first 64 KB of main memory	Faulty or improperly seated DIMM
1-3-4	Odd/even logic failure in the first 64 KB of main memory	
1-4-1	Address line failure in the first 64 KB of main memory	
1-4-2	Parity failure in the first 64 KB of main memory	
2-1-1 through 2-4-4	Bit failure in the first 64 KB of main memory	
3-1-1	Slave DMA-register failure	Defective system board
3-1-2	Master DMA-register failure	
3-1-3	Master interrupt-mask register failure	
3-1-4	Slave interrupt-mask register failure	
3-2-4	Keyboard-controller test failure	Faulty keyboard controller (defective system board)
3-3-4	Screen initialization failure	Faulty video subsystem (defective system board)
3-4-1	Screen-retrace test failure	
3-4-2	Search for video ROM failure	
4-2-1	No timer tick	Defective system board
4-2-2	Shutdown failure	
4-2-3	Gate A20 failure	
4-2-4	Unexpected interrupt in protected mode	
4-3-1	Memory failure above address 0FFFFh	Faulty or improperly seated DIMM
4-3-3	Timer-chip counter 2 failure	Defective system board

Table 3-1. POST Beep Codes *(continued)*

Beep Code	Error	Probable Causes
4-3-4	Time-of-day clock stopped	Bad battery or defective system board
4-4-1	Serial-port test failure	Faulty I/O chip (defective system board)
4-4-2	Parallel-port test failure	Faulty system board
4-4-3	Math coprocessor failure	Faulty microprocessor chip or system board
4-4-4	Cache test failure	Defective microprocessor or system board

System Error Messages

System error messages typically are presented on the screen during the POST but can occur any time an error is detected by the system. System messages are very useful in troubleshooting the system. Some of these messages require operator intervention to solve; others indicate fatal errors that must be solved before the system will reboot.

Table 3-2 lists the system error messages that can occur and the probable cause for each message.

Table 3-2. System Error Messages

Message	Definition	Probable Causes
`Address mark not found`	BIOS found faulty disk sector or could not find particular disk sector.	Faulty diskette/tape drive subsystem or hard-disk drive subsystem (defective system board).
`Attachment failed to respond`	Diskette drive or hard-disk drive controller cannot send data to associated drive.	Faulty interface cable or connector.
`Bad command or file name`	Command entered does not exist or is not in pathname specified.	Bad command.
`Bad error-correction code (ECC) on disk read`	Diskette drive or hard-disk drive controller detected uncorrectable read error.	Faulty diskette/tape drive subsystem or hard-disk drive subsystem (defective system board).
`Controller has failed`	Hard-disk drive or associated controller defective.	

Table 3-2. System Error Messages *(continued)*

Message	Definition	Probable Causes
`Data error`	Computer received unrecoverable data-read error from diskette or hard-disk drive.	Faulty diskette, diskette drive, or hard-disk drive.
`Decreasing available memory`	Read/write failure during POST prevents system from using available memory.	One or more DIMMs faulty or improperly seated.

`Diskette drive 0 seek failure`
 	
`Diskette drive 1 seek failure`
	Diskette/tape drive controller could not locate specific sector or track.	Faulty or improperly inserted diskette, incorrect configuration settings in System Setup program, loose diskette/tape drive interface cable, or loose power cable.

`Diskette read failure`	Failure occurred while system attempted to read diskette.	Faulty diskette, faulty or improperly connected diskette/tape drive interface cable, or loose power cable.
`Diskette subsystem reset failed`	System could not successfully issue reset command to diskette controller.	Faulty diskette/tape drive controller (defective system board).
`Diskette write protected`	Diskette write-protect feature activated.	Diskette write-protected.
`Drive not ready`	Diskette missing from or improperly inserted in diskette drive.	Defective, unformatted, or improperly inserted diskette.
`Gate A20 failure`	Gate A20 of the keyboard controller malfunctioned.	Faulty keyboard controller (defective system board).
`General failure`	Operating system cannot execute command.	Operating system corrupted or not installed properly.

`Hard disk controller failure`
 	
`Hard disk drive read failure`
 	
`Hard disk failure`
	Hard-disk drive failed to initialize.	Incorrect configuration settings in System Setup program, improperly connected hard-disk drive cable, faulty hard-disk drive controller subsystem (defective system board), or loose power cable.

Table 3-2. System Error Messages *(continued)*

Message	Definition	Probable Causes
`Invalid configuration information - please run SETUP program`	System Setup program contains incorrect system configuration settings.	Incorrect configuration settings in System Setup program or faulty battery.

`Keyboard clock line failure`
 	
`Keyboard data line failure`
 	
`Keyboard failure`
 	
`Keyboard stuck key failure`
	System cannot communicate with keyboard.	Keyboard cable connector loose or improperly connected, defective keyboard, or defective keyboard/mouse controller (defective system board).

`Keyboard controller failure`	Keyboard/mouse controller failed.	Defective keyboard/mouse controller (defective system board).
`Memory address line failure at` *`address`*`, read` *`value`* `expecting` *`value`* `Memory data line failure at` *`address`*`, read` *`value`* `expecting` *`value`* `Memory double word logic failure at` *`address`*`, read` *`value`* `expecting` *`value`* `Memory odd/even logic failure at` *`address`*`, read` *`value`* `expecting` *`value`* `Memory write/read failure at` *`address`*`, read` *`value`* `expecting` *`value`*	During memory test, *value* read at *address* was incorrect.	Faulty or improperly seated DIMMs or defective system board.

Table 3-2. System Error Messages *(continued)*

Message	Definition	Probable Causes
`Memory alloca-tion error`	Software in use conflicts with operating system, application, or utility.	Faulty application or utility.
`Memory tests terminated by keystroke`	Memory test did not complete.	POST memory test terminated by pressing the spacebar key.
`No boot device available`	System does not recognize diskette drive or hard-disk drive from which it is trying to boot.	Faulty diskette, diskette/tape drive subsystem, hard-disk drive, hard-disk drive subsystem, or no boot disk in drive A.
`No boot sector on hard-disk drive`	Configuration settings in System Setup program incorrect or operating system corrupted.	Incorrect configuration settings in System Setup program or no operating system on hard-disk drive.
`No timer tick interrupt`	Timer on system board malfunctioning.	Defective system board.
`Non-system disk or disk error`	Diskette in drive A, or hard-disk drive does not have bootable operating system installed on it.	Faulty diskette, diskette/tape drive subsystem, or hard-disk drive subsystem.
`Not a boot diskette`	No operating system on diskette.	No operating system on diskette.
`Plug and Play Configuration Error`	System encountered problem in trying to configure one or more expansion cards.	System resource conflict.
`Read fault`	MS-DOS cannot read from diskette or hard-disk drive.	Faulty diskette, diskette/tape drive subsystem, or hard-disk drive subsystem (defective system board).
`Requested sector not found`	System could not find particular sector on disk or requested sector defective.	
`Reset failed`	Disk reset operation failed.	Improperly connected diskette/tape drive, hard-disk drive interface cable, or power cable.
`Sector not found`	MS-DOS unable to locate sector on diskette or hard-disk drive.	Defective sectors on diskette or hard-disk drive.

Table 3-2. System Error Messages *(continued)*

Message	Definition	Probable Causes
`Seek error`	MS-DOS unable to locate specific track on diskette or hard-disk drive.	Defective diskette or hard-disk drive.
`Seek operation failed`	System could not find particular address mark on disk.	Faulty diskette or hard-disk drive.
`Shutdown failure`	System board chip faulty.	Defective system board.
`Time-of-day clock stopped`	Backup battery low.	Defective battery or faulty chip (defective system board).
`Time-of-day not set`	Time or date setting in System Setup program incorrect or system battery bad.	Incorrect Time or Date settings or defective system battery.
`Timer chip counter 2 failed`	Timer circuit on system board malfunctioning.	Defective system board.
`Unexpected interrupt in protected mode`	Keyboard/mouse controller malfunctioning or one or more DIMMs improperly seated.	Improperly seated DIMMs or faulty keyboard/mouse controller chip (defective system board).

`Write fault`
 	
`Write fault on selected drive`
	MS-DOS cannot write to diskette or hard-disk drive.	Faulty diskette or hard-disk drive.

CHAPTER 4
Removing and Replacing Parts on the Low-Profile Chassis

This chapter provides procedures for removing the components, assemblies, and subassemblies in the Dell OptiPlex G1 low-profile computer. If you are servicing a midsize or mini tower chassis, use Chapter 5 or 6, as appropriate for your system.

Unless otherwise noted, each procedure assumes the following:

- You have performed the steps in "Precautionary Measures" found later in this chapter.
- You have removed the computer cover.
- You can replace or reinstall a part by performing the removal procedure in reverse order unless additional information is provided.

Recommended Tools

Most of the procedures in this chapter require the use of one or more of the following tools:

- Small flat-blade screwdriver
- Wide flat-blade screwdriver
- #1 and #2 Phillips screwdrivers
- 1/4-inch nutdriver
- Tweezers or long-nose pliers

Also, use a wrist grounding strap as explained in the next section, "Precautionary Measures."

Precautionary Measures

Before you perform any of the procedures in this chapter, take a few moments to read the following warning for your personal safety and to prevent damage to the system from ESD.

WARNING FOR YOUR PERSONAL SAFETY AND PROTECTION OF THE EQUIPMENT

Before you start to work on the system, perform the following steps in the sequence listed:

1. **Turn off the computer and any attached peripherals.**
2. **Disconnect the computer and any attached peripherals from their power sources to reduce the potential for personal injury. Also, disconnect any telephone or telecommunication lines from the computer.**
3. **Wait 5 seconds after powering down the computer before disconnecting a peripheral from the computer or removing a component from the computer's system board to avoid possible damage to the system board.**

Wear a wrist grounding strap, and clip it to an unpainted metal surface, such as the padlock loop on the back of the chassis. If a wrist grounding strap is not available, periodically touch an unpainted metal surface on the back of the computer to discharge any static charge from your body. Avoid touching components and contacts on a card, and avoid touching pins on a chip to prevent static electricity damage.

Inside the Computer

Figure 4-1 shows an internal view of the interior of the low-profile computer and identifies major components for orientation. Refer to this illustration, as needed, when performing the component removal/replacement procedures in this chapter.

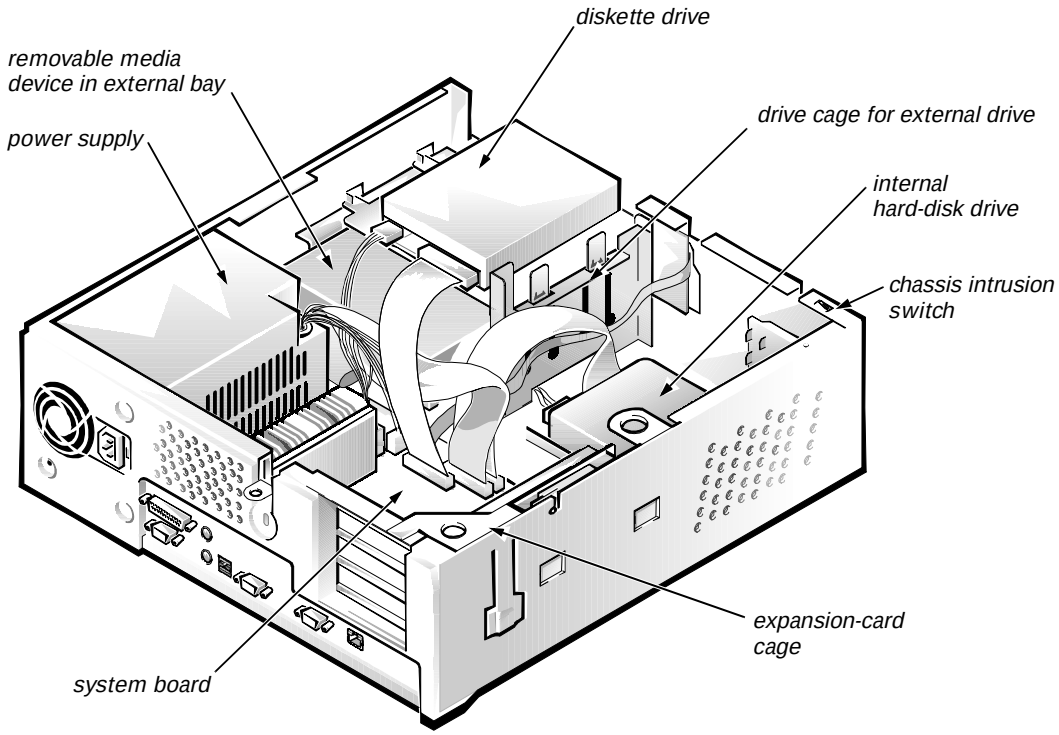


Figure 4-1. Internal View of the Low-Profile Compute r

Using the Optional Stand for Vertical Orientation

Dell offers an optional stand that you can attach to the computer for a mini tower (vertical) orientation. Although you can attach (and remove) the stand at any time with a minimum of system disruption, it is easiest to attach before you set up your computer and connect the back-panel cables.

To attach the stand, follow these steps:

1. **Turn the computer onto its right side, so that the drive bays are at the bottom.**

2. **Fit the stand onto what *was* the left side of the computer.**

   Position the stand as shown in Figure 4-2. Align the large round hole in the stand with the securing button on the side of the cover, and align the captive thumbscrew in the stand with the screw hole in the cover.

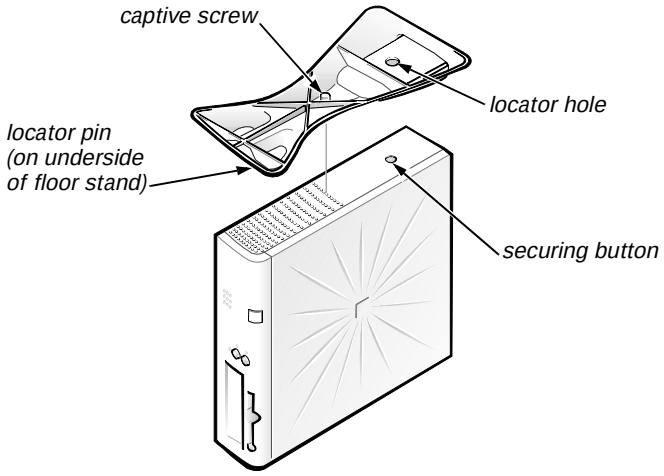


Figure 4-2. Attaching the Optional Stand for Vertical Orientation

   As you lower the stand into place, make sure that the locator pin (see Figure 4-2) fits into the corner hole of the hole pattern as shown. When the stand is in place, tighten the thumbscrew.

3. **Rotate the computer so that the stand is at the bottom and the drives are at the top.**

To remove the stand, turn the computer over so the stand is at the top, loosen the screw and lift the stand away, and then place the computer in a horizontal position.

Computer Cover

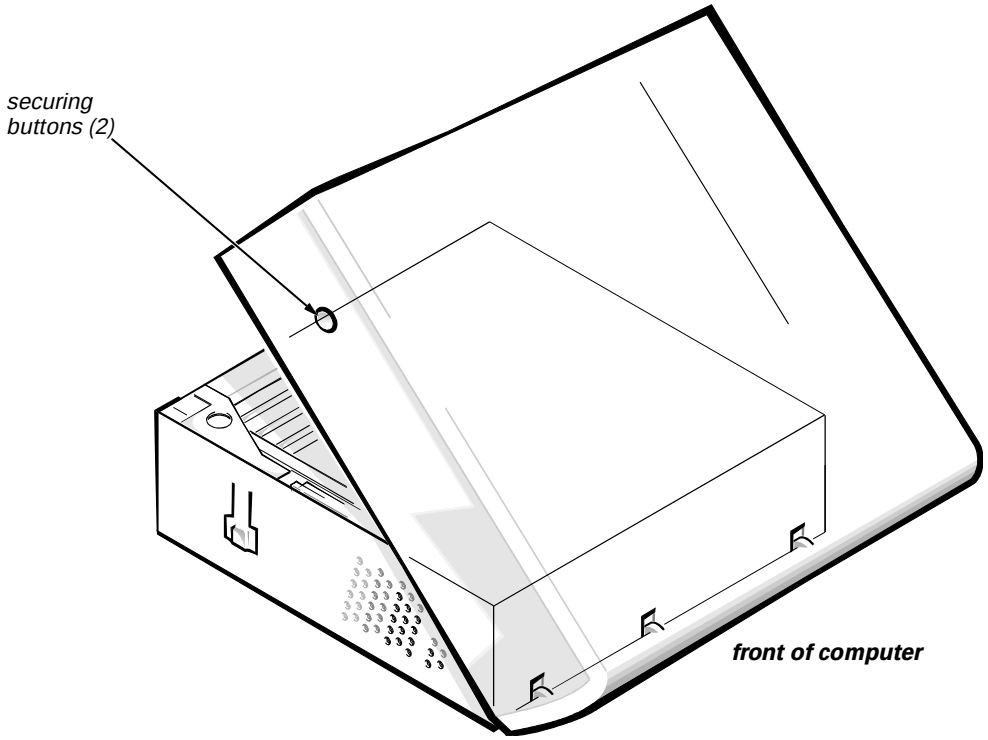


Figure 4-3. Computer Cover Removal

To remove the computer cover, follow these steps:

1. **Turn off power to all peripherals, and disconnect the AC power cable from its AC outlet.**
2. **Remove the padlock if one is installed.**
3. **Press in on the two securing buttons until the cover is free to swing up.**
4. **Raise the back of the cover, and pivot it toward the front of the computer.**
5. **Lift the cover off of the hooks at the front of the chassis.**

   Three plastic hooks on the inside-front part of the cover secure it to the chassis.

Before you reinstall the cover, fold all cables out of the way so that they do not interfere with the cover or with proper airflow inside the computer.

NOTE: After removing and replacing the chassis, the chassis intrusion detector alerts you that the cover has been removed. Refer to "Chassis Intrusion Detection" in Chapter 1 for instructions on resetting the chassis intrusion detector.

Eject, Power, and Reset Buttons

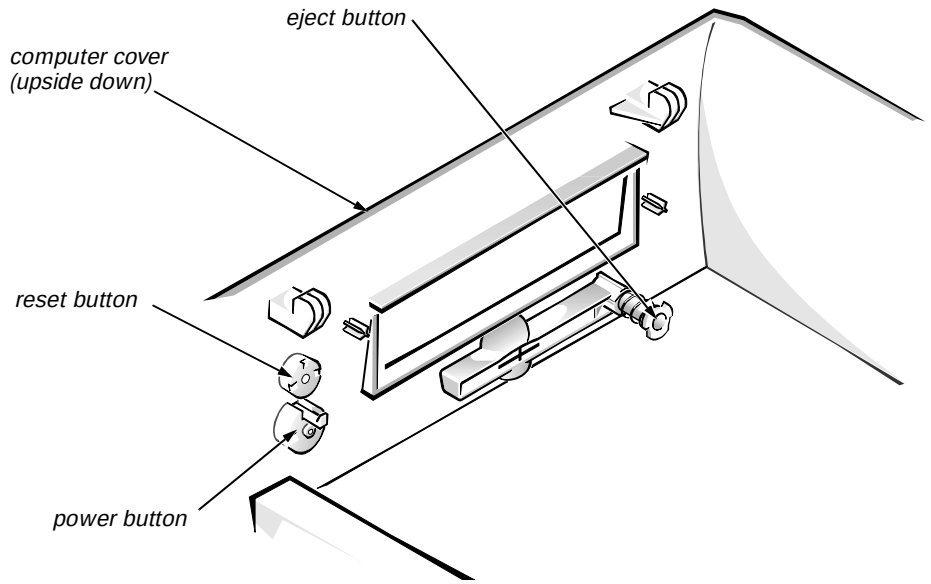


Figure 4-4. Eject, Power, and Reset Button Removal

To remove the eject, power, and reset buttons, follow these steps:

1. **Lay the computer cover upside down on a flat work surface, with the back of the cover facing you.**

2. **To remove the 3.5-inch diskette-drive eject button, pull gently on the plastic part of the button until it comes free.**

3. **To remove the power button or the reset button, use a small screwdriver and push in on the two or three plastic clips that hold the button to the computer cover.**

   When these clips are released, the button comes free from the front panel of the cover.

Front-Panel Inserts

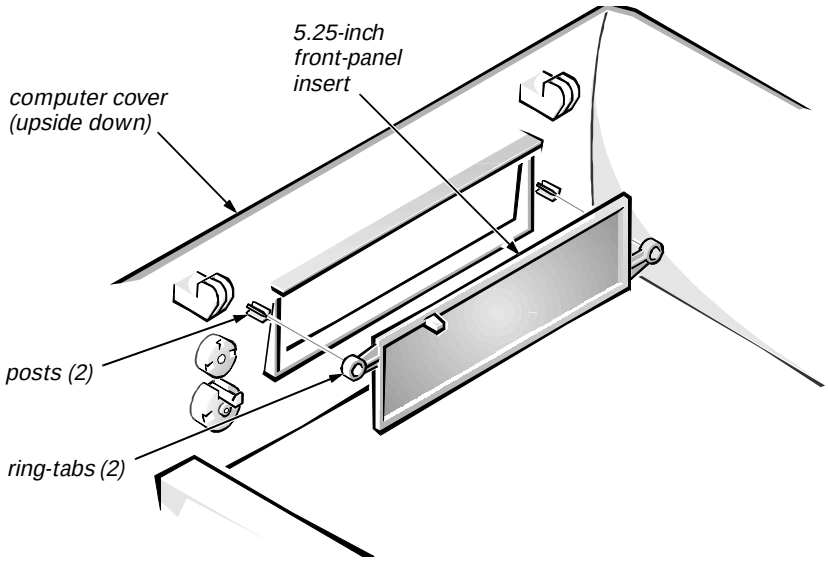


Figure 4-5. Front-Panel Insert Removal

To remove a front-panel insert, follow these steps:

1. **Lay the computer cover upside down on a flat work surface, with the front of the cover facing you.**

2. **From the front of the cover, use your thumbs to push inward on the insert until it slides off the two posts.**

To replace a 5.25-inch front-panel insert, position the two ring-tabs over the posts on the inside of the bay opening, and then press the ring-tabs over the posts. If necessary, use a 1/4-inch nutdriver to help push on the ring-tabs.

Control Panel

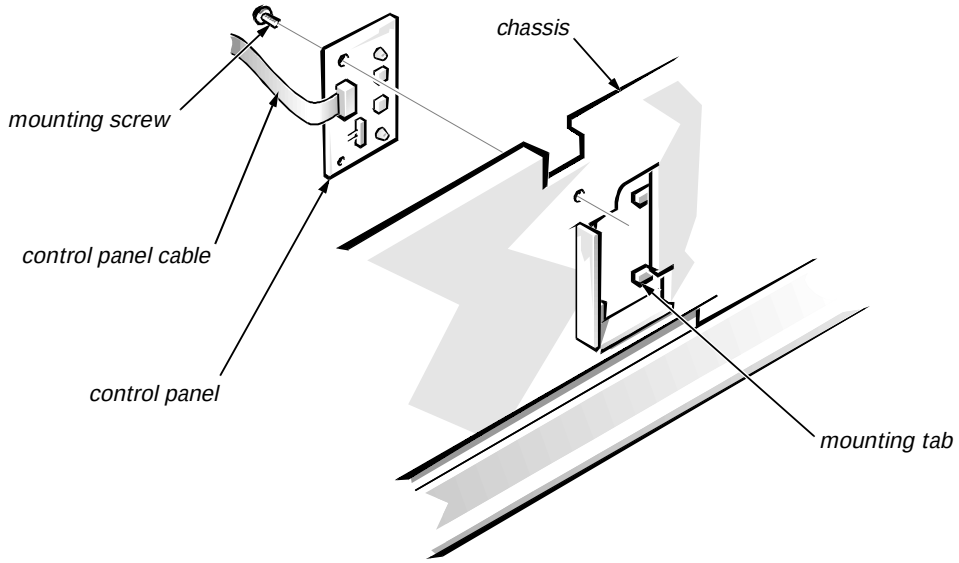


Figure 4-6. Control Panel Removal

To remove the control panel, follow these steps:

1. **Disconnect the control panel cable from the PANEL connector on the system board (see Figure 4-16).**
2. **From the inside of the chassis, remove the mounting screw holding the control panel to the chassis.**
3. **Remove the control panel from the chassis.**

When you reinstall the control panel, be sure to put the right side of the control panel behind the mounting tab.

Drives

Figure 4-6 shows an example of drive hardware that can be installed in the computer. Refer to this figure when you perform any of the procedures in the following subsections.

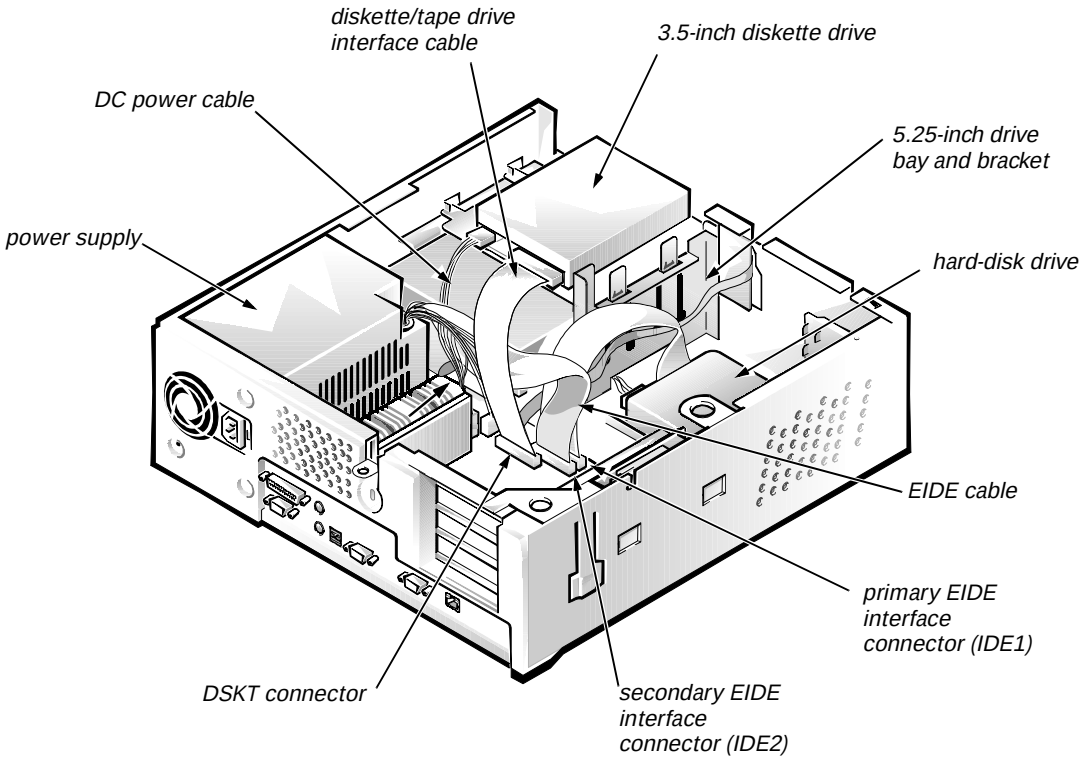


Figure 4-7. Drive Hardware

Externally Accessible Drive Assemblies

The following subsections contain removal/replacement procedures for drives installed in the externally accessible drive bays.

3.5-Inch Diskette Drive Assembly

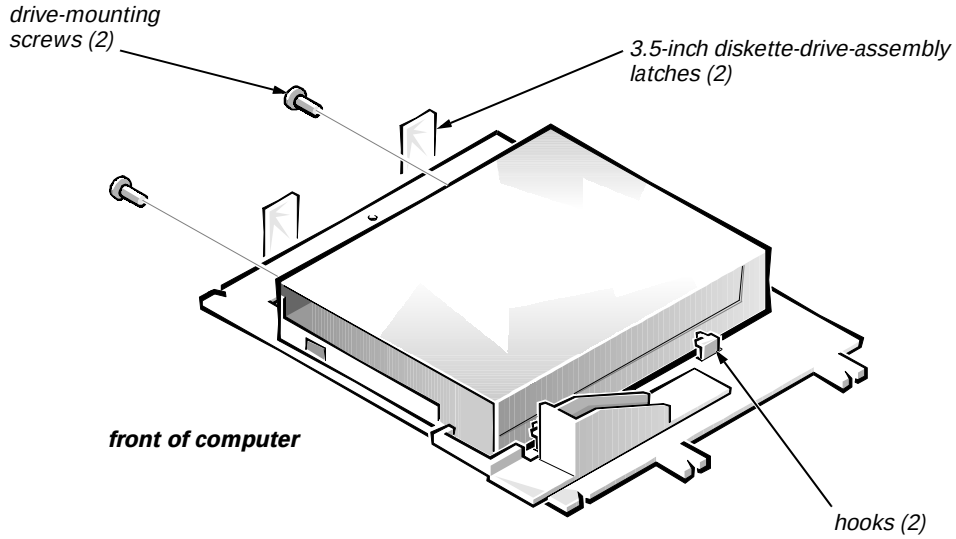


Figure 4-8. 3.5-Inch Diskette Drive Removal

To remove the 3.5-inch diskette drive assembly, follow these steps:

1. **Disconnect the DC power cable and the interface cable from the back of the diskette drive.**
2. **Press the two 3.5-inch diskette-drive-assembly latches to the left to release the assembly.**

   Rotate the left side of the assembly up, and lift the assembly out of the chassis.
3. **Remove the two drive-mounting screws from the left side of the drive, and remove the drive from the bracket.**

When you replace the 3.5-inch diskette drive, be sure that the mounting holes on the right side of the drive engage the two hooks on the bracket.

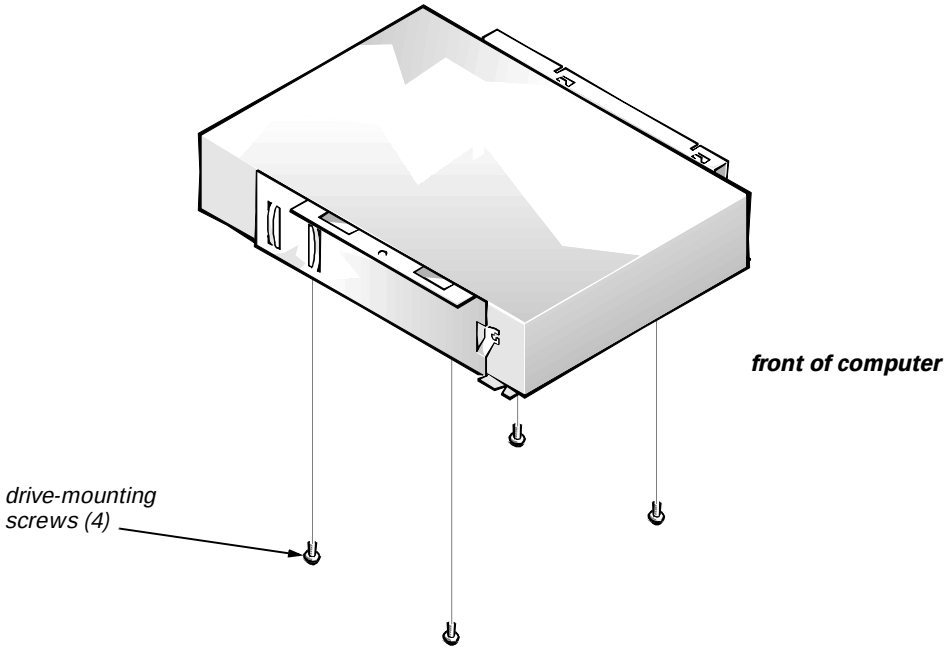


Figure 4-9. 5.25-Inch Drive Assembly Removal

To remove a 5.25-inch drive assembly, follow these steps:

1. **Remove the 3.5-inch diskette drive assembly.**
2. **Disconnect the DC power cable and the interface cable from the back of the 5.25-inch drive.**
3. **Lift the 5.25-inch drive assembly straight up and out of the chassis.**
4. **Lay the 5.25-inch drive assembly upside down; then remove the four screws attaching the drive to the bracket.**

When you replace the 5.25-inch drive, place the front of the drive toward the front of the bracket; then install the four screws, but do not tighten them. Align the screws with the score marks on the bracket, and tighten the screws in the order stamped on the bottom of the bracket.

Check the alignment of the computer cover around the 5.25-inch drive bezel. Adjust the drive forward or backward on the bracket to align it.

Hard-Disk Drive Assembly

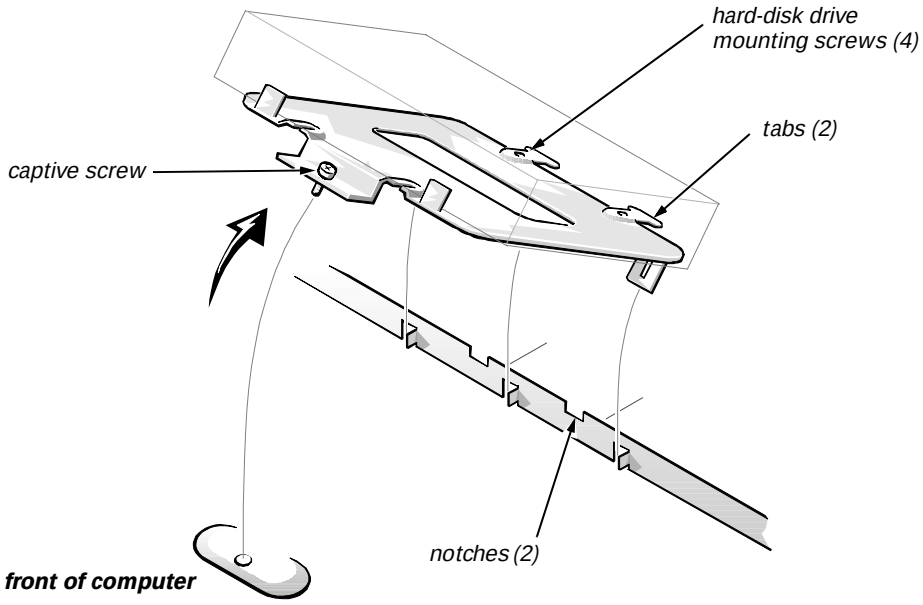


Figure 4-10. Hard-Disk Drive Assembly Removal

To remove the hard-disk drive, follow these steps:

1. **Disconnect the DC power cable and the interface cable from the back of the drive.**
2. **Loosen the captive screw that secures the hard-disk drive bracket to the chassis.**
3. **Pivot the hard-disk drive assembly up and lift it out of the chassis.**
4. **Remove the four hard-disk drive mounting screws that attach the hard-disk drive to the hard-disk drive bracket.**

When you reinstall the hard-disk drive assembly, be sure that the tabs on the back of the mounting plate fully engage the notches on the chassis—before you rotate the assembly into place.

System Power Supply

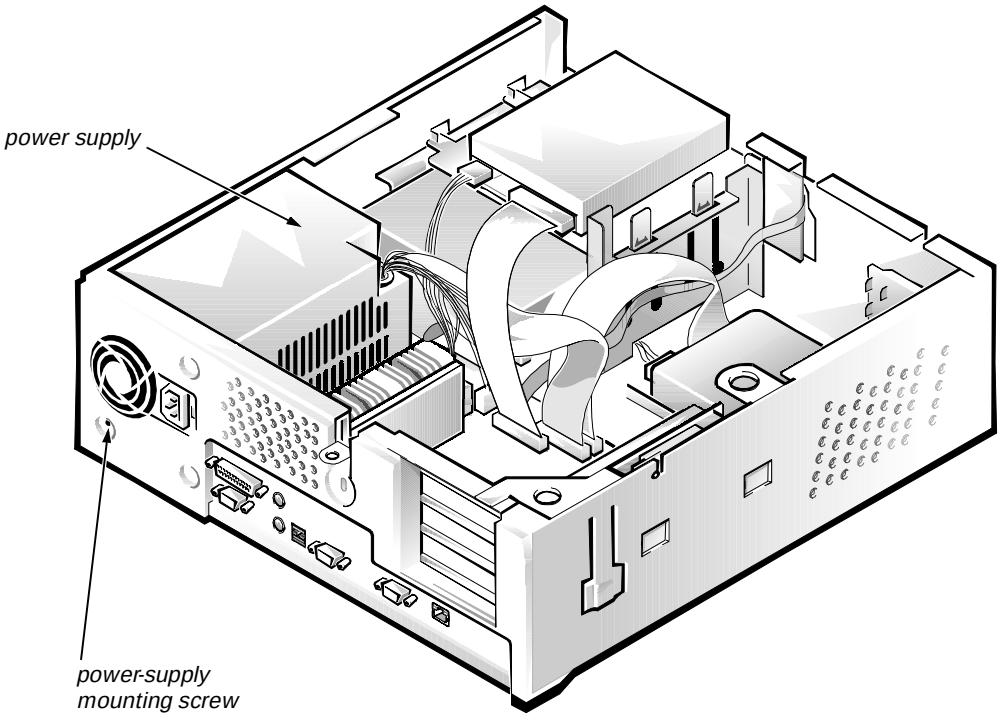


Figure 4-11. System Power-Supply Removal

To remove the system power supply, follow these steps:

1. **Disconnect the AC power cable from the back of the power supply.**
2. **Disconnect the DC power cables from the system board and the drives.**
3. **Remove the power-supply mounting screw at the back of the chassis.**
4. **Slide the system power supply forward until it stops; then lift it from the chassis.**

When you replace the system power supply, place it down inside the chassis and against the right side of the chassis. Then slide the system power supply toward the back of the chassis, and hook the tabs into the right side of the power supply.

WARNING: The voltage selection switch, located on the back of the power supply assembly, must be set to the correct operating voltage (115 or 230 V) before the power cable is plugged into an AC outlet.

Expansion Cards

The computer has a removable expansion-card cage. The expansion-card cage contains the riser board and any installed expansion cards. Dell recommends that you remove the expansion-card cage first before removing or installing expansion cards.

If you are not removing any of the expansion cards, leave the external cables attached to the expansion cards.

Expansion-Card Cage

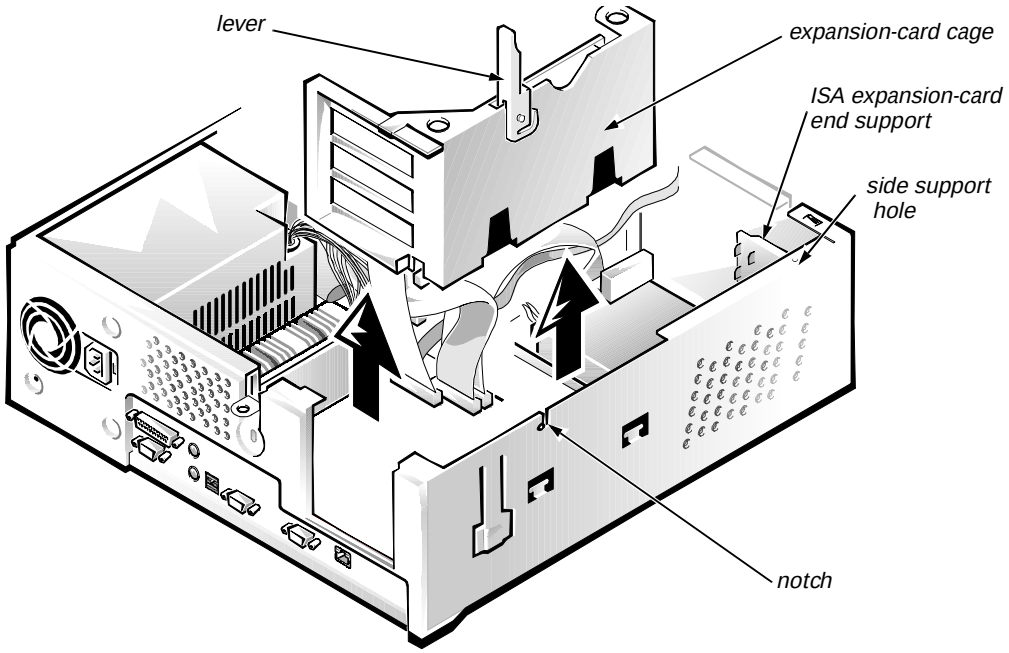


Figure 4-12. Expansion-Card Cage Removal

To remove an expansion-card cage, follow these steps:

1. **Rotate the lever toward the back of the computer until it stops in the upright position.**

2. **Lift the expansion-card cage up and away from the computer.**

To replace an expansion-card cage, keep it flush against the chassis to ensure that the lever engages the notch in the chassis when the lever is depressed.

If reinstalling an ISA expansion card into the expansion-card cage, be sure to slip the end of the ISA expansion card into the plastic ISA expansion-card end support. The ISA expansion-card end support should not be removed; however, if it is accidentally removed, reinstall it by first inserting its top tab into the side support hole and then sliding the bottom two tabs into the two support holes on the chassis floor.

Expansion Card

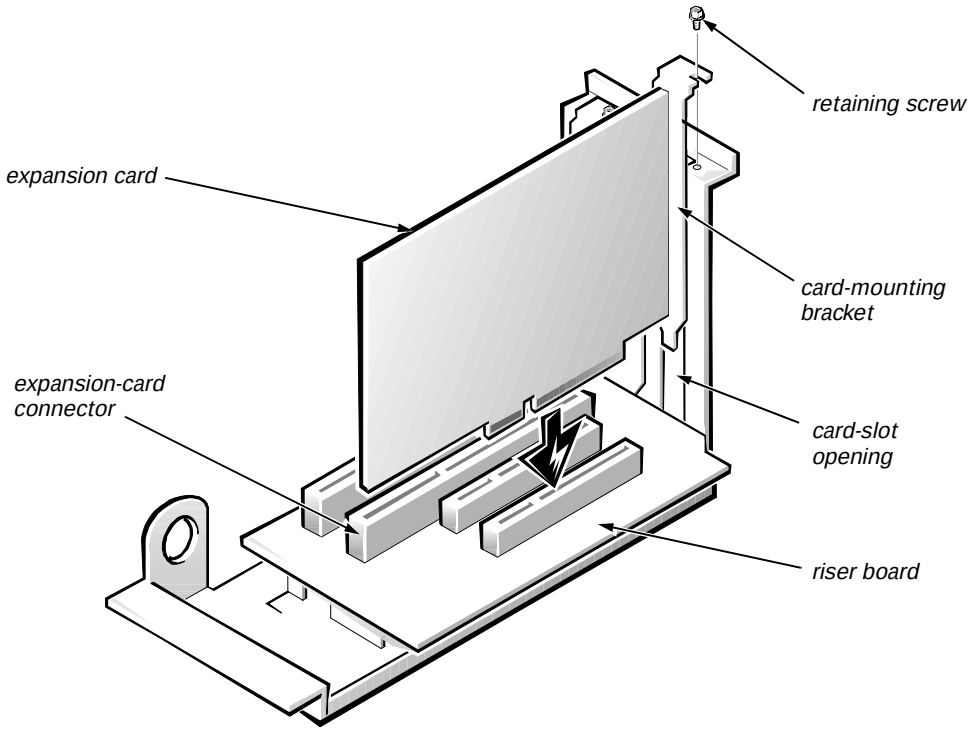


Figure 4-13. Expansion-Card Removal

To remove an expansion card, follow these steps:

1. **Disconnect any external cables from the expansion card being removed.**
2. **Remove the expansion-card cage.**
3. **Remove the retaining screw from the card-mounting bracket.**
4. **Grasp the expansion card by its corners, and carefully remove it from the expansion-card connector.**

Riser Board

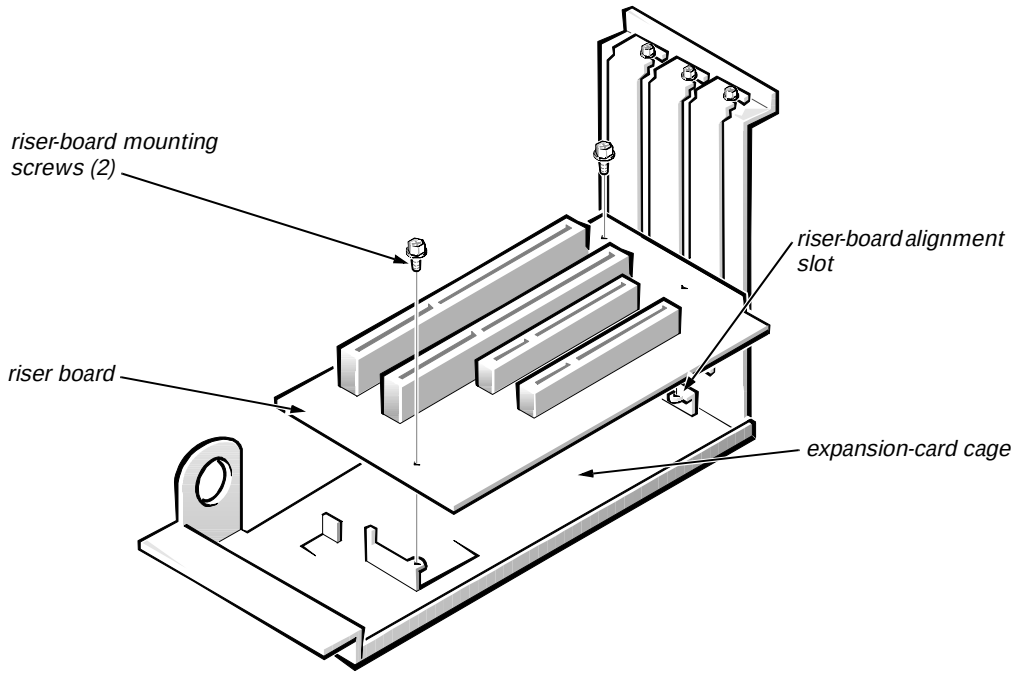


Figure 4-14. Riser Board Removal

To remove the riser board, follow these steps:

1. **Remove the expansion-card cage and all expansion cards.**
2. **Lay the expansion-card cage on a flat work surface, with the riser board facing up.**
3. **Remove the two riser-board mounting screws.**
4. **Lift the riser board away from the expansion-card cage.**

When you replace the riser board, be sure that the alignment feature on the expansion-card cage engages with the alignment slot.

System Board

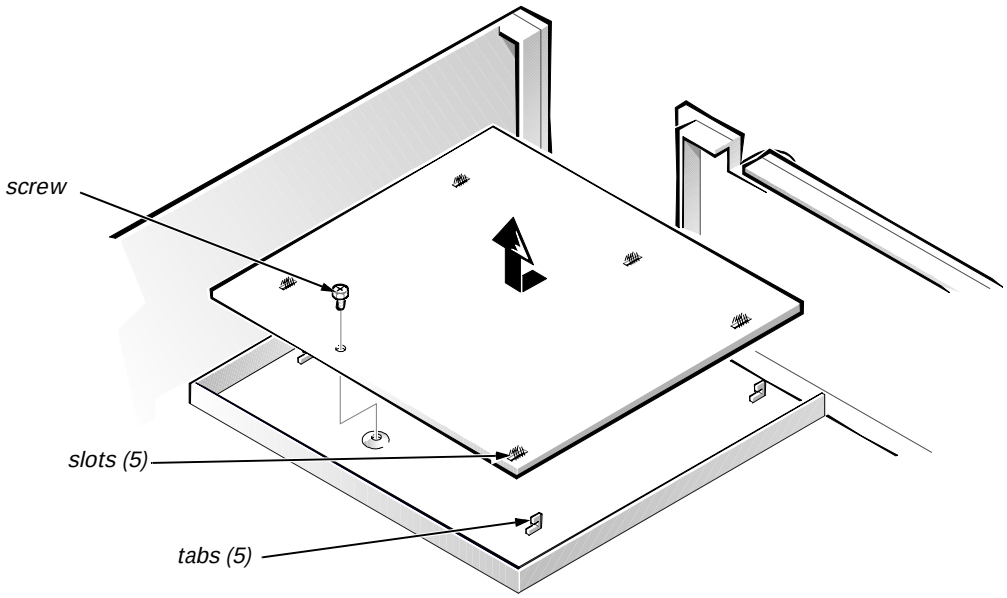


Figure 4-15. System Board Removal

To remove the system board, follow these steps:

1. **Disconnect all cables from their connectors at the back of the computer.**
2. **Remove the expansion-card cage.**
3. **Disconnect all cables from the system board.**
4. **Remove the screw that secures the system board to the bottom of the chassis.**
5. **Slide the system board toward the front of the chassis until it stops.**
6. **Carefully lift the system board out of the chassis (be sure to lift evenly and not twist the system board).**

NOTES: If you are replacing the system board, remove all DIMMs, the video-memory upgrade module (if present), the single-edge contact (SEC) cartridge/ heat sink assembly, and the guide bracket assembly from the old system board and install them on the replacement board. Also, set the jumpers on the new system board so that they are identical to those on the old board, unless a microprocessor upgrade is being installed.

If the original system board has a NIC connector, ensure that the replacement board has a NIC connector.

When you reinstall the system board (before you slide the system board back to lock it in position), push down near each slot to engage the grounding clip

onto its corresponding tab. Push evenly on both sides of the system board as you slide it into position (do not twist the system board).

System Board Components

The subsections that follow Figure 4-16 contain procedures for removing/replacing system board components.

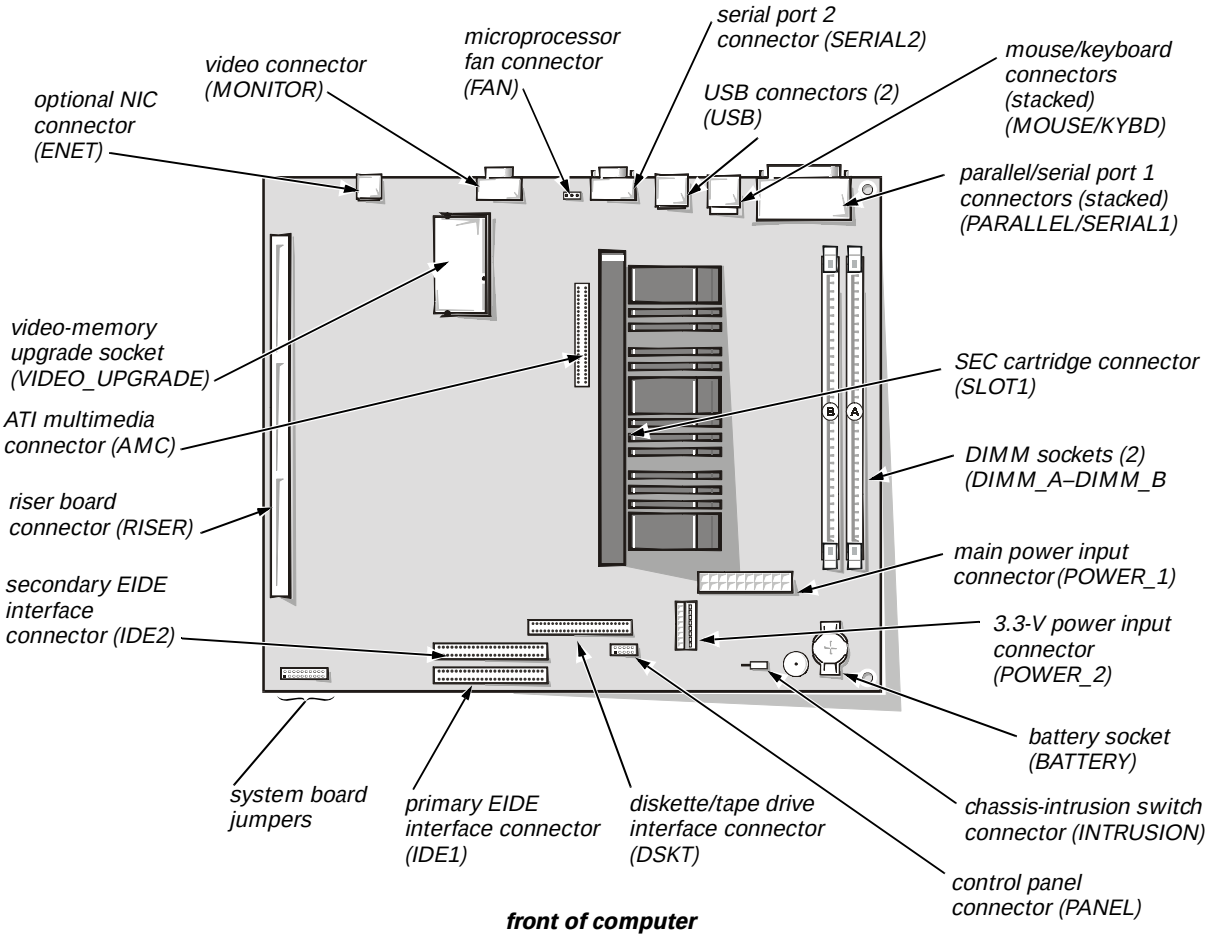

serial port 2 connector (SERIAL2)
microprocessor fan connector (FAN)
video connector (MONITOR)
mouse/keyboard connectors (stacked) (MOUSE/KYBD)
optional NIC connector (ENET)
USB connectors (2) (USB)
parallel/serial port 1 connectors (stacked) (PARALLEL/SERIAL1)
video-memory upgrade socket (VIDEO_UPGRADE)
SEC cartridge connector (SLOT1)
ATI multimedia connector (AMC)
DIMM sockets (2) (DIMM_A–DIMM_B
riser board connector (RISER)
main power input connector (POWER_1)
secondary EIDE interface connector (IDE2)
3.3-V power input connector (POWER_2)
battery socket (BATTERY)
system board jumpers
primary EIDE interface connector (IDE1)
diskette/tape drive interface connector (DSKT)
chassis-intrusion switch connector (INTRUSION)
control panel connector (PANEL)
front of computer

Figure 4-16. System Board Components

DIMMs

To remove a DIMM from one of the two DIMM sockets, follow these steps:

1. **Locate the two DIMM sockets (see Figure 4-15).**
2. **To remove a DIMM, push outward on the DIMM socket's securing clips until the DIMM is released from its socket.**

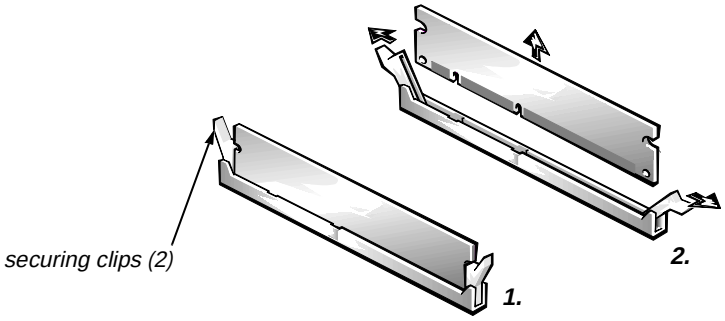


Figure 4-17. DIMM Removal

3. **Lift the DIMM away from the socket.**
4. **Reinstall the replacement DIMM by pressing the DIMM fully into the socket and then closing the securing clips to lock the DIMM into the socket.**

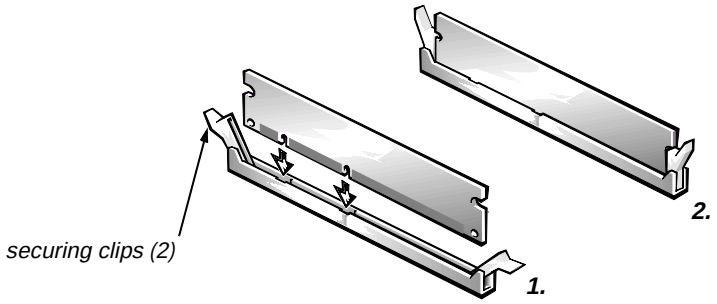


Figure 4-18. DIMM Installation

5. **Replace all assemblies and cables previously removed.**

Video Memory

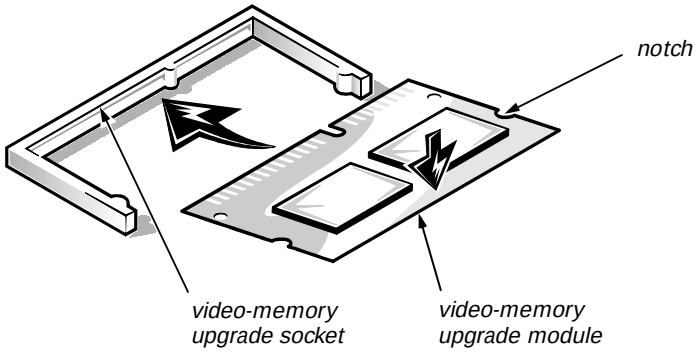


Figure 4-19. Installing a Video-Memory Upgrade Module

You can upgrade video memory from 2 to 4 MB by installing a video-memory upgrade module in the video-memory upgrade socket on the system board. Adding additional video memory increases the system's video performance and provides additional modes for high-resolution/expanded color applications.

To install the video memory upgrade, follow these steps:

1. **Remove the expansion-card cage.**

CAUTION: To avoid possible damage to the video-memory upgrade socket and/or video-memory upgrade module, the module is keyed and must be correctly positioned before inserting it into the socket.

2. **Orient the video-memory upgrade module as shown in Figure 4-19. Then carefully align the module's edge connector pins with the socket, ensuring that the slot in the module mates with the socket key.**

3. **Press the video-memory upgrade module firmly into the socket, and pivot the module downward until it clicks into place.**

   If you do not hear a sharp click when installing the video-memory upgrade module, remove the module and repeat steps 2 and 3.

4. **Replace the expansion-card cage.**

5. **Replace the computer cover, and reconnect the AC power cable to the AC outlet. Press the power button on the computer to reboot the system.**

   As the system boots, it automatically detects the presence of the new video-memory upgrade module and automatically changes the system configuration information in the System Setup program.

6. **Enter the System Setup program, and confirm that 4 MB is shown in the Video Memory category.**

   If the total memory is listed incorrectly, repeat steps 1 through 6 to reseat the video-memory upgrade module and verify that the computer acknowledges the module.

7. **Run the Video Test Group in the system diagnostics to test the new video-memory upgrade module.**

Microprocessor

To take advantage of future options in processor speed and functionality, you can replace the microprocessor on your system board with any Dell-supported microprocessor upgrade. The microprocessor upgrade kit is shipped with an SEC cartridge/heat sink assembly, which includes the microprocessor, microprocessor heat sink, and L2-cache memory module.

You may also have to reseat or replace an SEC cartridge/heat sink assembly during normal maintenance.

SEC Cartridge/Heat Sink Assembly

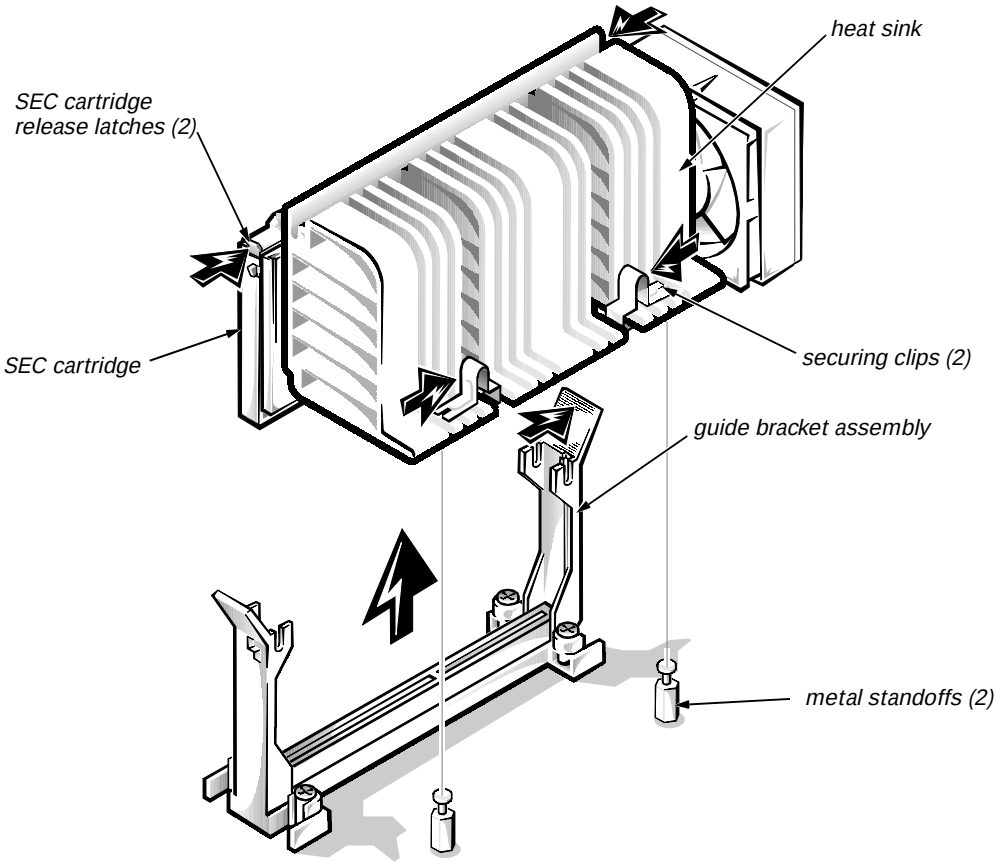


Figure 4-20. SEC Cartridge/Heat Sink Removal

To remove the SEC cartridge/heat sink assembly, follow these steps:

WARNING: The SEC cartridge/heat sink assembly can get extremely hot during system operations. Be sure that the assembly has had sufficient time to cool before touching it.

1. **Locate the SEC cartridge/heat sink assembly.**
2. **Disconnect the microprocessor fan connector from the 3-pin connector on the system board (labeled "FAN"), located between the SERIAL2 connector and the MONITOR connector (see Figure 4-16).**

3. **Release the two securing clips near the base of the heat sink from the metal standoffs.**

4. **Locate and press inward on the SEC cartridge release latches (located directly on top of the SEC cartridge adjacent to the heat sink assembly) until the latches click.**

5. **Lift the SEC cartridge/heat sink assembly out of its guide bracket assembly/connector on the system board.**

NOTE: When installing the SEC cartridge/heat sink assembly, carefully orient the assembly and press firmly with up to 25 pounds of force to mate the SEC cartridge with its connector. Then slide the SEC cartridge release latches outward to lock the assembly onto the metal standoffs.

System Battery

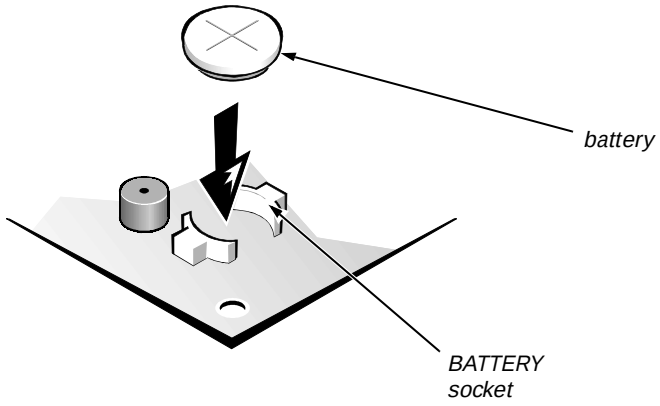


Figure 4-21. System Battery Installation

To remove the system battery, follow these steps:

1. **If possible, boot the system and enter the System Setup program. Then record important system configuration information (see Appendix A, "System Setup Program," for details).**

2. **Turn off power to all peripherals, and disconnect the AC power cable from its AC outlet.**

3. **Remove the computer cover.**

4. **Remove the expansion-card cage, and locate the battery in the front-right corner of the system board adjacent to the DIMM connectors (see Figure 4-16).**

CAUTION: If you pry out the battery with a blunt object, be careful not to touch the system board with the object. Ensure that the object is inserted between the battery and the socket before attempting to pry out the battery. Otherwise, you may damage

the system board by prying off the socket or by breaking traces on the system board.

5. **Remove the battery by carefully prying it out of its socket with your fingers or with a blunt, nonconducting object, such as a plastic screwdriver.**

WARNING
WARNING: There is a danger of the new battery exploding if it is incorrectly installed. When you replace the system battery, orient the new battery with the "+" facing up (see Figure 4-20). Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

6. **Insert the battery into the socket (with the positive side labeled "+" facing upwards), and snap it into place.**
7. **Replace the expansion-card cage, reconnect all cabling, replace the computer cover, and reboot the system.**
8. **Enter the System Setup program, and configure the system using the information from the printouts you made earlier.**
9. **Turn off the computer and wait 10 minutes. Then reenter the System Setup program to ensure that the date and time are still correct, indicating that the system battery is functioning correctly.**

CHAPTER 5
Removing and Replacing Parts on the Midsize Chassis

This chapter provides procedures for removing the components, assemblies, and subassemblies in the Dell OptiPlex G1 midsize computer. If you are servicing a low-profile or mini tower chassis, use Chapter 4 or 6, as appropriate for your system.

Unless otherwise noted, each procedure assumes the following:

- You have performed the steps in "Precautionary Measures" found later in this chapter.
- You have removed the computer cover.
- You can replace or reinstall a part by performing the removal procedure in reverse order unless additional information is provided.

Recommended Tools

Most of the procedures in this chapter require the use of one or more of the following tools:

- Small flat-blade screwdriver
- Wide flat-blade screwdriver
- #1 and #2 Phillips screwdrivers
- 1/4-inch nutdriver
- Tweezers or long-nose pliers

Also, use a wrist grounding strap as explained in the next section, "Precautionary Measures."

Precautionary Measures

Before you perform any of the procedures in this chapter, take a few moments to read the following warning for your personal safety and to prevent damage to the system from ESD.

WARNING FOR YOUR PERSONAL SAFETY AND PROTECTION OF THE EQUIPMENT

Before you start to work on the system, perform the following steps in the sequence listed:

1. **Turn off the computer and any attached peripherals.**
2. **Disconnect the computer and any attached peripherals from their power sources to reduce the potential for personal injury. Also, disconnect any telephone or telecommunication lines from the computer.**
3. **Wait 5 seconds after powering down the computer before disconnecting a peripheral from the computer or removing a component from the computer's system board to avoid possible damage to the system board.**

Wear a wrist grounding strap, and clip it to an unpainted metal surface, such as the padlock loop on the back of the chassis. If a wrist grounding strap is not available, periodically touch an unpainted metal surface on the back of the computer to discharge any static charge from your body. Avoid touching components and contacts on a card, and avoid touching pins on a chip to prevent static electricity damage.

Inside the Computer

Figure 5-1 shows an internal view of the midsize computer and identifies major components for orientation. Refer to this illustration, as needed, when performing the component removal/replacement procedures in this chapter.

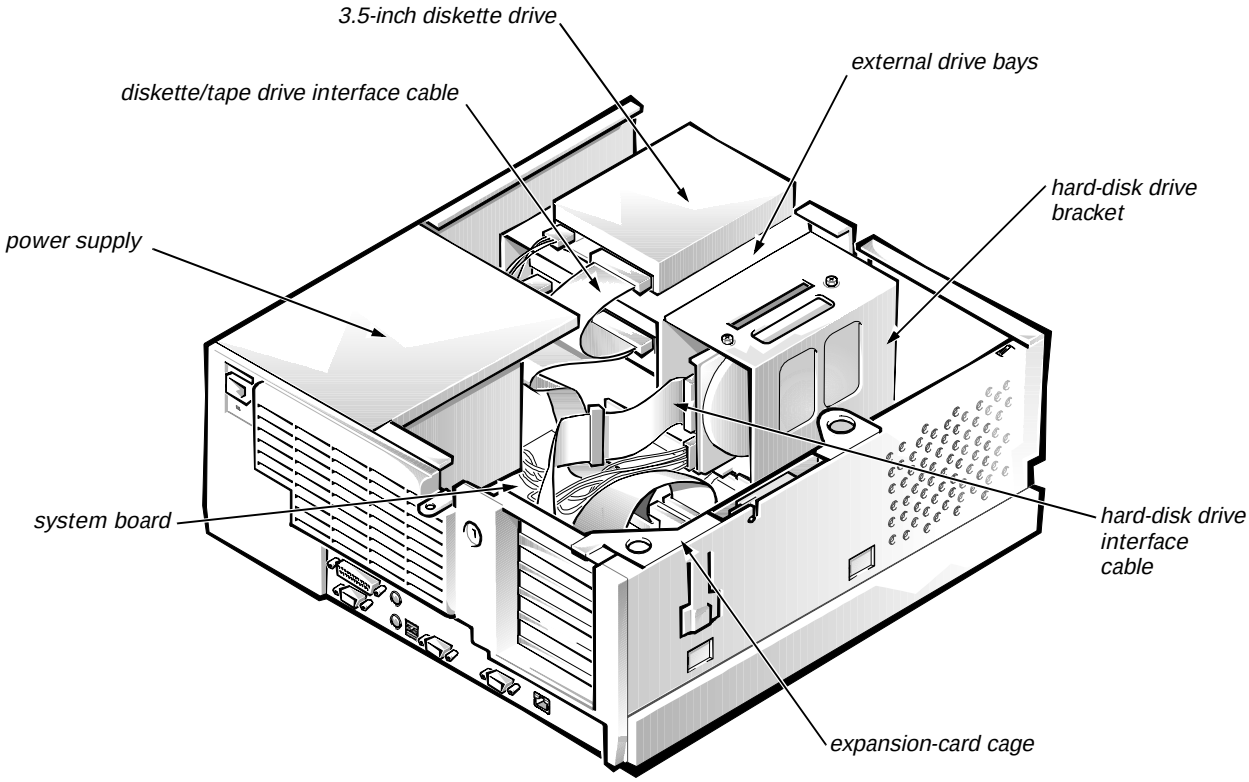


Figure 5-1. Internal View of the Midsize Computer

Using the Optional Stand for Vertical Orientation

Dell offers an optional stand that you can attach to the computer for a mini tower (vertical) orientation. Although you can attach (and remove) the stand at any time with a minimum of system disruption, it is easiest to attach before you set up your computer and connect the back-panel cables.

To attach the stand, follow these steps:

1. **Turn the computer onto its right side, so that the drive bays are at the bottom.**

2. **Fit the stand onto what *was* the left side of the computer.**

   Position the stand as shown in Figure 5-2. Align the large round hole in the stand with the securing button on the side of the cover, and align the captive thumbscrew in the stand with the screw hole in the cover.

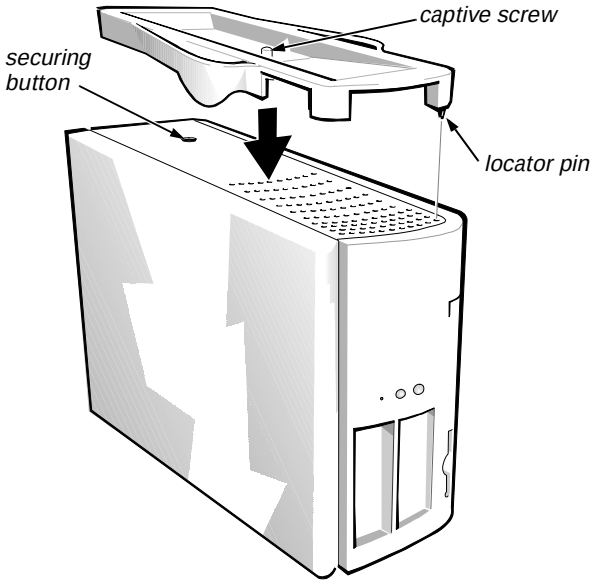


Figure 5-2. Attaching the Optional Stand for Vertical Orientation

As you lower the stand into place, make sure that the locator pin (see Figure 5-2) fits into the corner hole of the hole pattern as shown. When the stand is in place, tighten the thumbscrew.

3. **Rotate the computer so that the stand is at the bottom and the drives are at the top.**

To remove the stand, turn the computer over so the stand is at the top, loosen the screw and lift the stand away, and then place the computer in a horizontal position.

Computer Cover

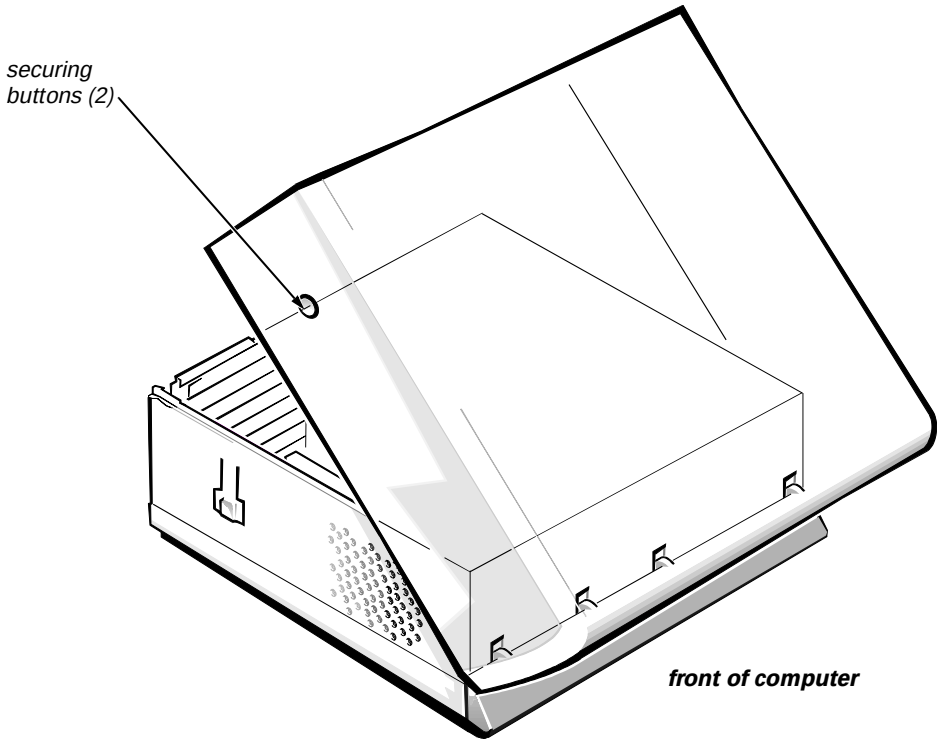


Figure 5-3. Computer Cover Removal

To remove the computer cover, follow these steps:

1. **Turn off power to all peripherals, and disconnect the AC power cable from its AC outlet.**

2. **Press in on the two securing buttons until the cover is free to swing up.**

3. **Raise the back of the cover, and pivot it toward the front of the computer.**

4. **Lift the cover off the hooks at the front of the chassis.**

   Four plastic hooks on the inside-front part of the cover secure it to the chassis.

Before you reinstall the cover, fold all cables out of the way so that they do not interfere with the cover or with proper airflow inside the computer.

NOTE: After removing and replacing the chassis, the chassis intrusion detector alerts you that the cover has been removed. Refer to "Chassis Intrusion Detection" in Chapter 1 for instructions on resetting the chassis intrusion detector.

Eject, Power, and Reset Buttons

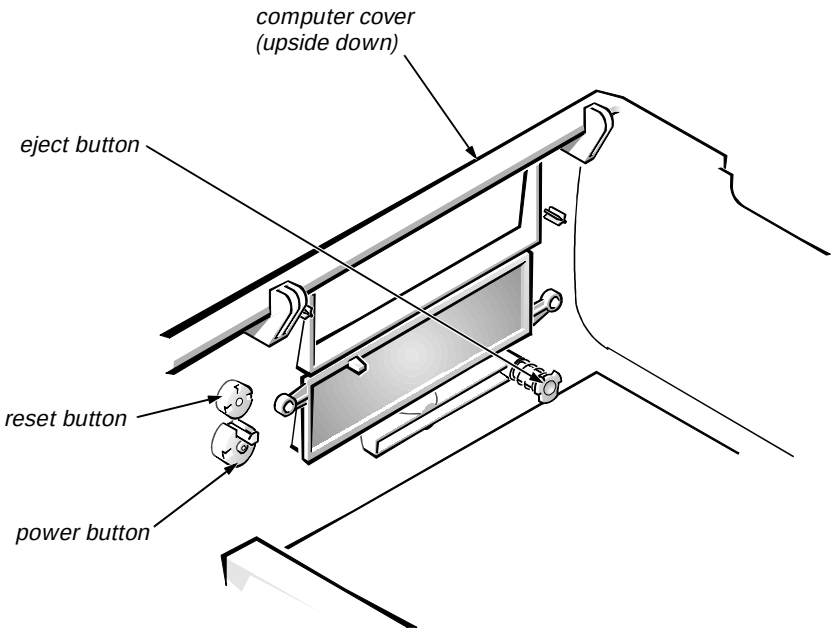


Figure 5-4. Eject, Power, and Reset Button Removal

To remove the eject, power, and reset buttons, follow these steps:

1. **Lay the computer cover upside down on a flat work surface, with the back of the cover facing you.**

2. **To remove the 3.5-inch diskette-drive eject button, pull gently on the plastic part of the button until it comes free.**

3. **To remove the power button or the reset button, use a small screwdriver and push in on the two or three plastic clips that hold the button to the computer cover.**

   When these clips are released, the button comes free from the front panel of the cover.

Front-Panel Inserts

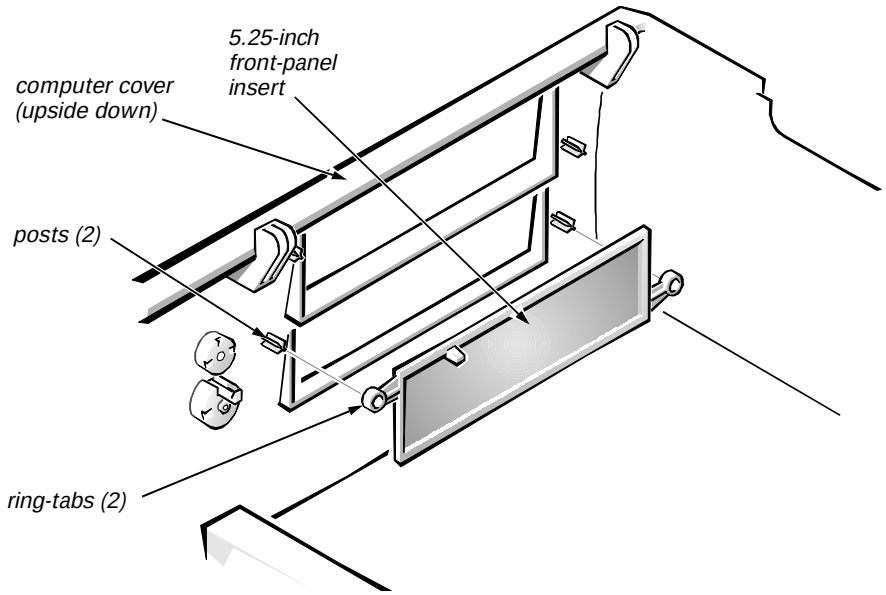


Figure 5-5. Front-Panel Insert Removal

To remove a front-panel insert, follow these steps:

1. **Lay the computer cover upside down on a flat work surface, with the front of the cover facing you.**
2. **From the front of the cover, use your thumbs to push inward on the insert until it slides off the two posts.**

To replace a 5.25-inch front-panel insert, position the two ring-tabs over the posts on the inside of the bay opening, and then press the ring-tabs over the posts. If necessary, use a 1/4-inch nutdriver to help push on the ring-tabs.

Control Panel

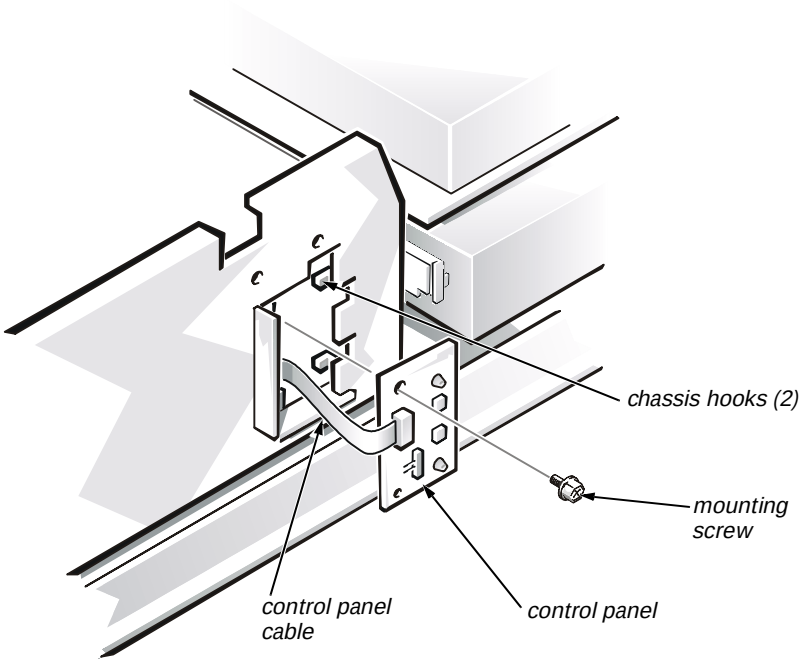


Figure 5-6. Control Panel Removal

To remove the control panel, follow these steps:

1. **Remove the hard-disk drive bracket.**
2. **Disconnect the control panel cable from the PANEL connector on the system board (see Figure 5-18).**
3. **Remove the mounting screw holding the control panel to the chassis.**
4. **Slide the control panel out of the hooks holding it to the chassis.**

   Note the routing of the control panel cable as you remove it from the chassis.

Drives

Figure 5-7 shows an example of drive hardware that can be installed in the computer. Refer to this figure when you perform any of the procedures in the following subsections.

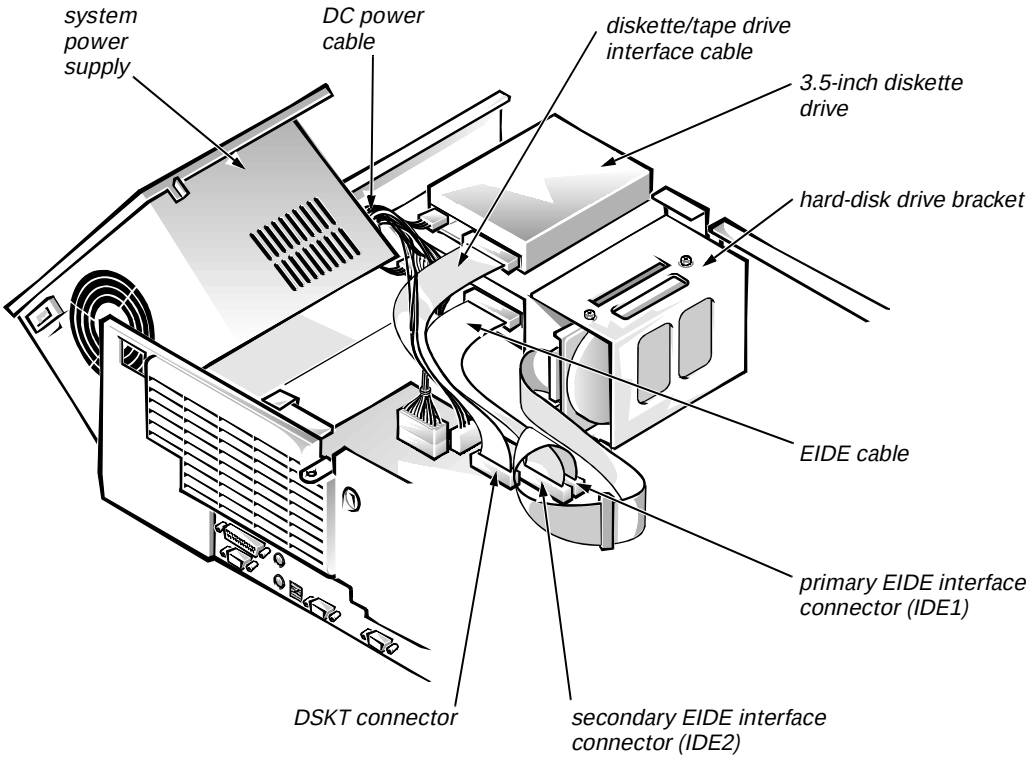


Figure 5-7. Drive Hardware

Externally Accessible Drive Assemblies

The following subsections contain removal/replacement procedures for drives installed in the externally accessible drive bays.

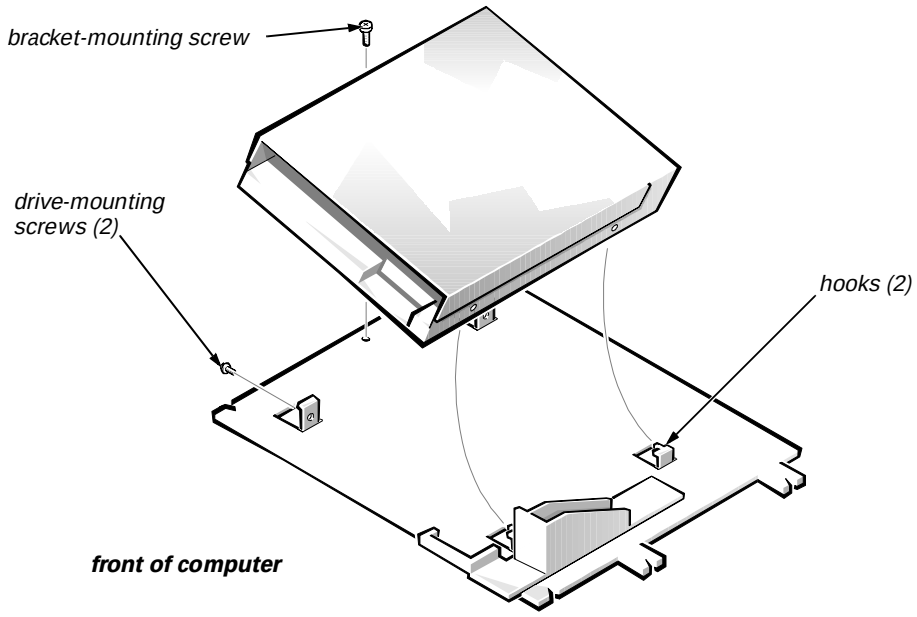


Figure 5-8. 3.5-Inch Diskette Drive Removal

To remove the 3.5-inch diskette drive, follow these steps:

1. **Disconnect the DC power cable and the interface cable from the back of the 3.5-inch diskette drive.**
2. **Remove the bracket-mounting screw.**
3. **Rotate the left side of the 3.5-inch diskette drive assembly up, and lift the assembly out of the chassis.**
4. **Remove the two drive-mounting screws from the left side of the drive, and remove the drive from the bracket.**

When you replace the 3.5-inch diskette drive, be sure that the two hooks on the right side of the bracket engage the mounting holes in the side of the 3.5-inch diskette drive.

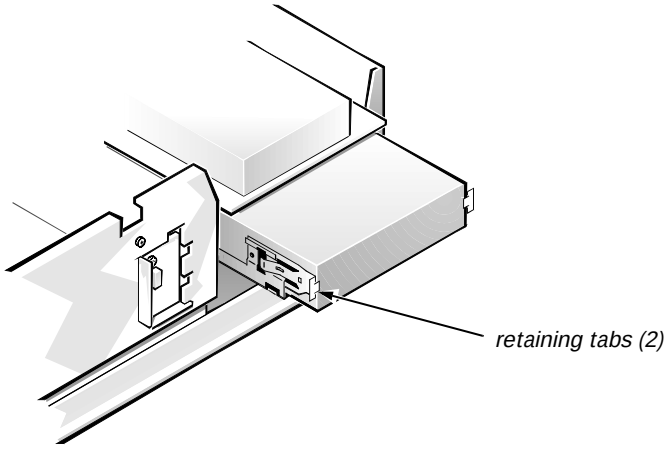


Figure 5-9. 5.25-Inch Drive Assembly Removal

To remove a 5.25-inch drive assembly from the middle or lower drive bay, follow these steps:

1. **Disconnect the DC power cable and the interface cable from the back of the drive.**
2. **Press in on the two retaining tabs (one on each side of the drive), and slide the drive assembly forward to remove it.**
3. **Remove the four screws attaching the 5.25-inch drive to the mounting plate, and lift the drive out of the mounting plate (see Figure 5-10).**

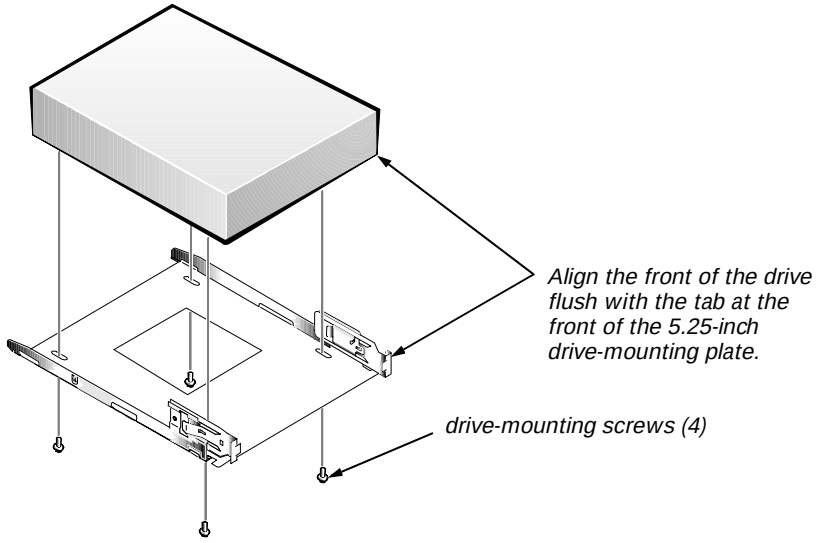


Figure 5-10. 5.25-Inch Drive Removal

When you replace the 5.25-inch drive, align the front of the drive flush with the tab at the front of the mounting plate. Insert the four screws, and tighten them in the order stamped on the bottom of the 5.25-inch drive-mounting plate.

Hard-Disk Drive Bracket

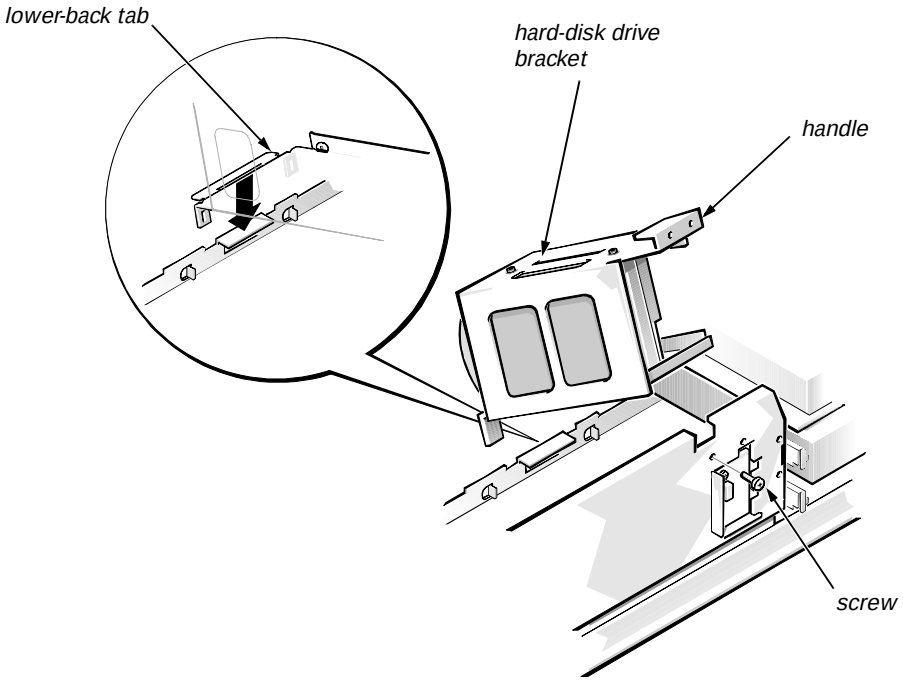


Figure 5-11. Hard-Disk Drive Bracket Removal

To remove the hard-disk drive bracket, follow these steps:

1. **Disconnect the DC power cable and the interface cable from the back of each hard-disk drive installed in the hard-disk drive bracket.**
2. **Remove the screw that secures the hard-disk drive bracket to the front of the chassis.**
3. **Grasp the handle on the front of the bracket, and rotate the front of the bracket up until the hooks are free from the chassis.**
4. **Lift the hard-disk drive bracket out of the computer.**

When you reinstall the hard-disk drive bracket, place the lower-back tab of the hard-disk drive bracket into position (be sure that the opening in the lower-back tab is over the alignment tab on the chassis); then rotate the front of the bracket down into position.

Hard-Disk Drive

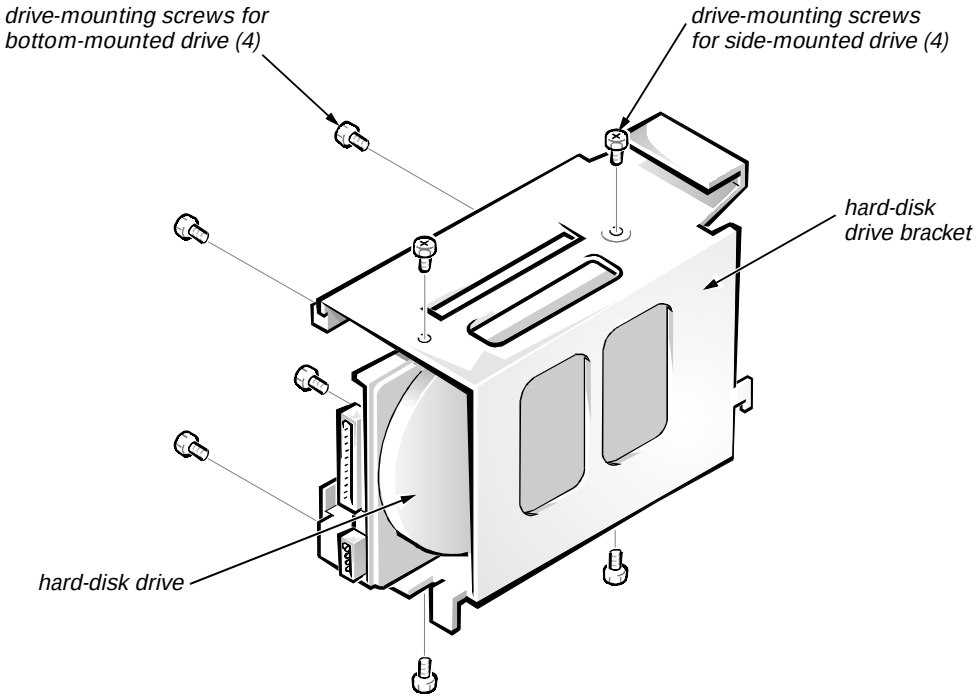

drive-mounting screws for bottom-mounted drive (4)
drive-mounting screws for side-mounted drive (4)
hard-disk drive bracket
hard-disk drive

Figure 5-12. Hard-Disk Drive Removal

To remove the hard-disk drive, follow these steps:

1. **Remove the hard-disk drive bracket.**
2. **Remove the four screws that attach the hard-disk drive to the hard-disk drive bracket.**

   One hard-disk drive attaches to the hard-disk drive bracket at the sides of the drive. The other hard-disk drive attaches to the hard-disk drive bracket at the bottom of the hard-disk drive.
3. **Slide the drive out of the hard-disk drive bracket.**

System Power Supply

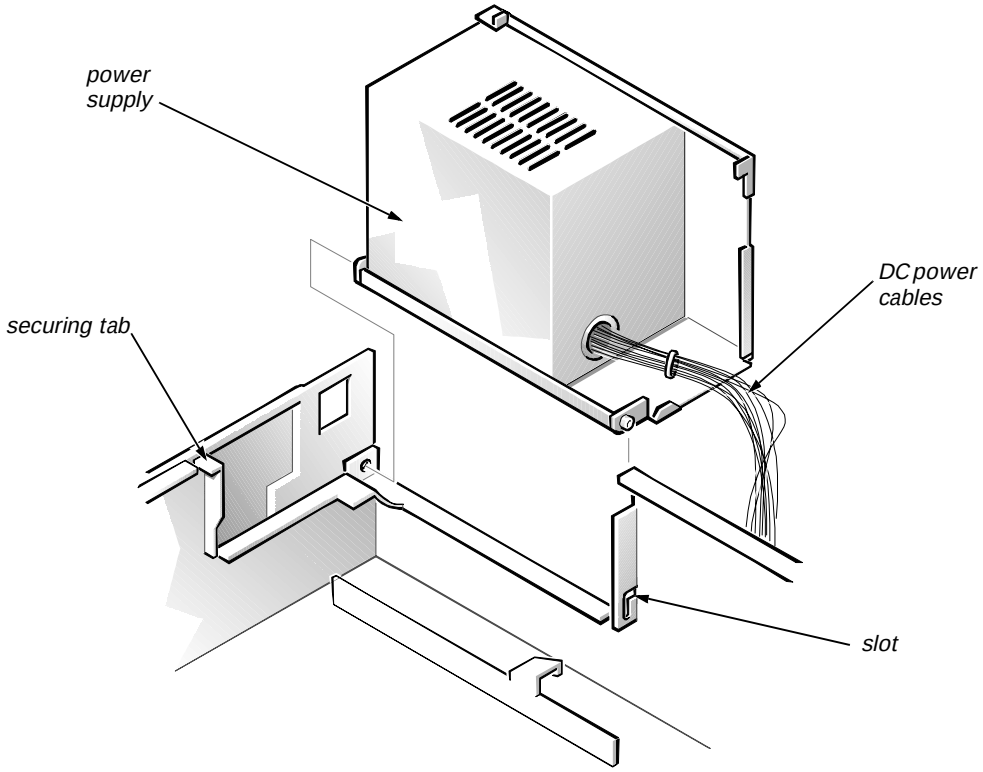


Figure 5-13. System Power-Supply Removal

To remove the system power supply, follow these steps:

1. **Disconnect the AC power cable from the back of the power supply.**
2. **Free the system power supply from the securing tab labeled "RELEASE —>," and rotate it to the right until it stops.**

   Press the securing tab to the left to release the power supply.
3. **Disconnect the DC power cables from the system board and the drives.**
4. **Lift the front end of the system power supply up, and move it to the right to disengage the power supply from the slot in the chassis.**
5. **Lift the system power supply from the computer.**

Expansion Cards

The computer has a removable expansion-card cage. The expansion-card cage contains the riser board and any installed expansion cards. Dell recommends that you remove the expansion-card cage first before removing or installing expansion cards.

If you are not removing any expansion cards, leave the external cables attached to them.

Expansion-Card Cage

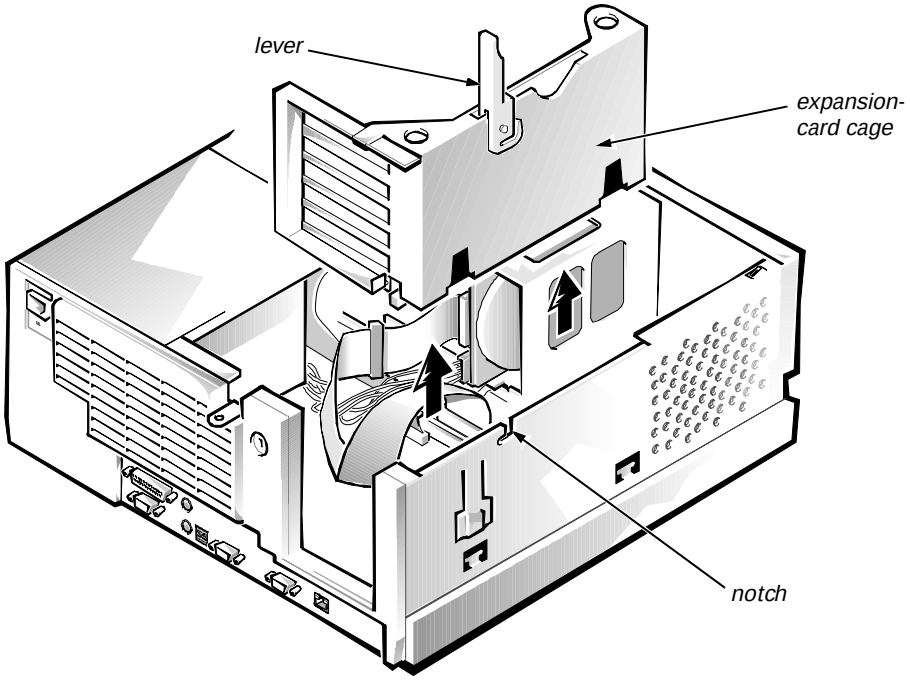


Figure 5-14. Expansion-Card Cage Removal

To remove an expansion-card cage, follow these steps:

1. **Rotate the lever toward the back of the computer until it stops in the upright position.**
2. **Lift the expansion-card cage up and away from the computer.**

To replace an expansion-card cage, keep the cage flush against the chassis to ensure that the lever engages the notch when the lever is depressed.

Expansion Card

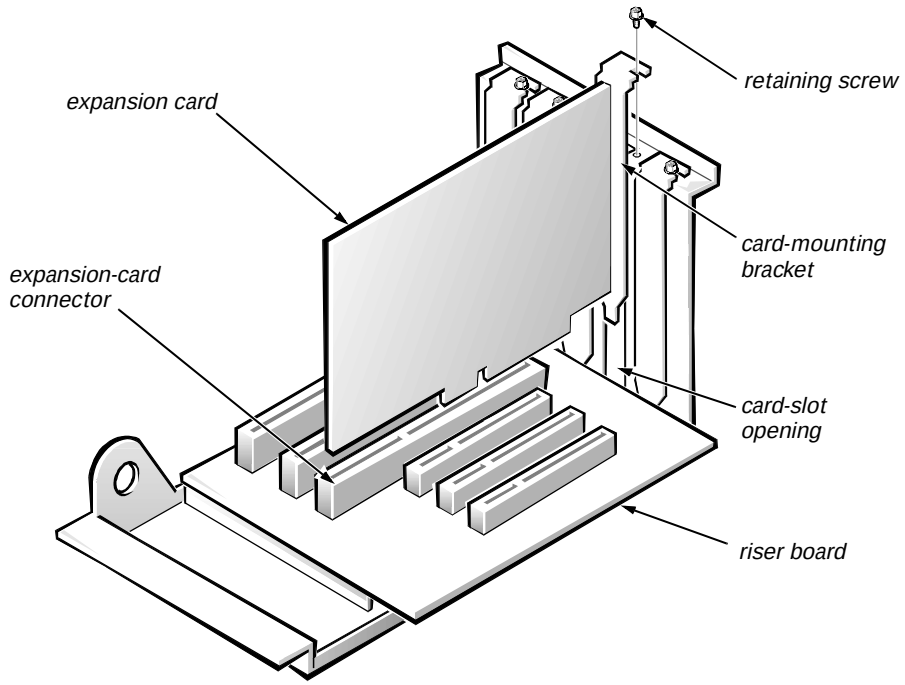


Figure 5-15. Expansion-Card Removal

To remove an expansion card, follow these steps:

1. **Disconnect any cables from the expansion card being removed.**
2. **Remove the expansion-card cage.**
3. **Remove the retaining screw from the card-mounting bracket.**
4. **Grasp the expansion card by its corners, and carefully remove it from the expansion-card connector.**

Riser Board

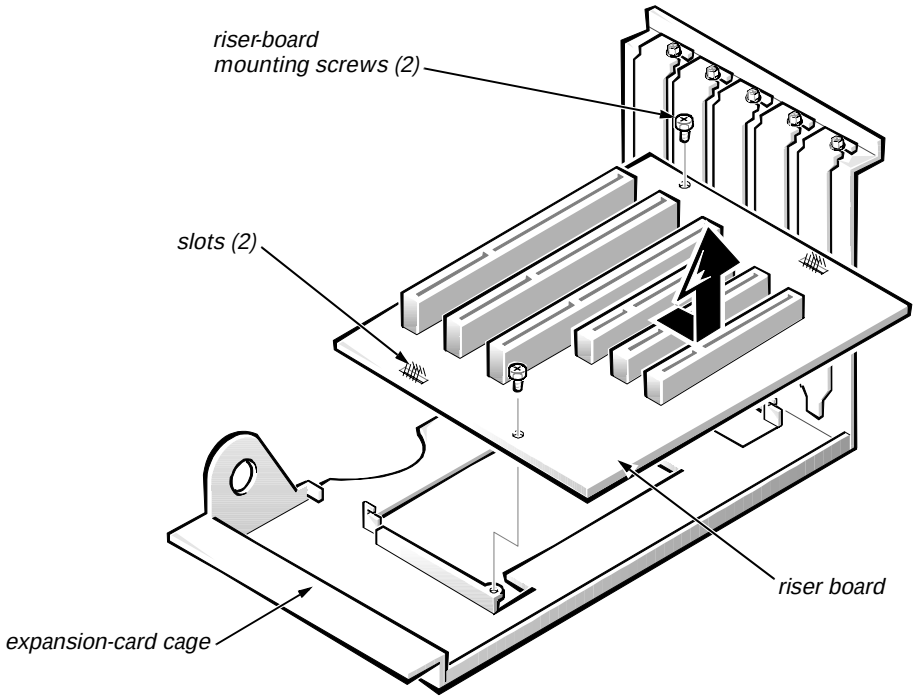


Figure 5-16. Riser Board Removal

To remove the riser board, follow these steps:

1. **Remove the expansion-card cage and all expansion cards.**
2. **On a flat work surface, turn the expansion-card cage over, with the riser board facing up.**
3. **Remove the riser-board mounting screws.**
4. **Slide the riser board down until it stops; then lift the riser board away from the expansion-card cage.**

System Board

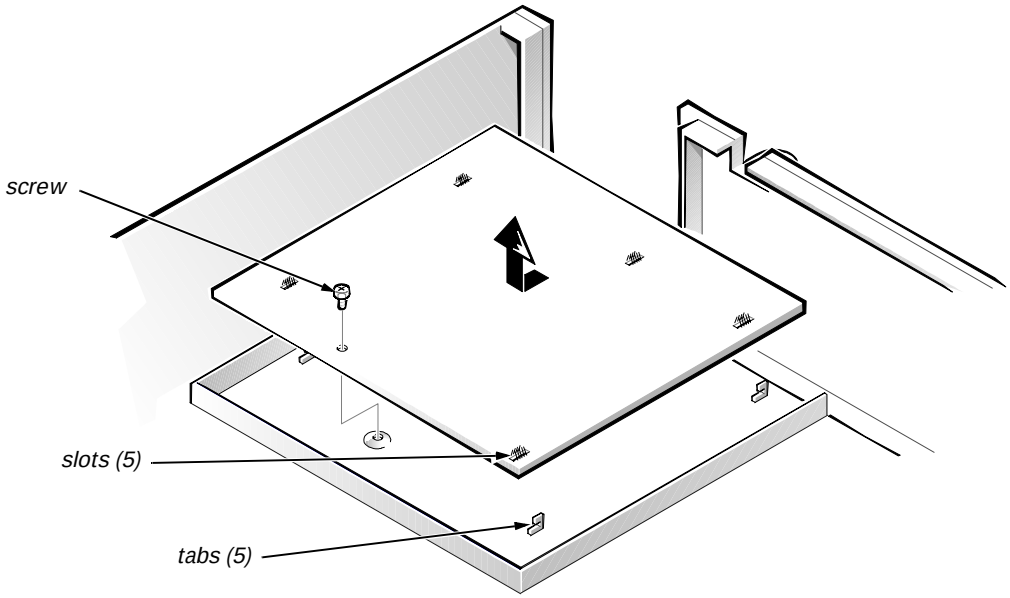


Figure 5-17. System Board Removal

To remove the system board, follow these steps:

1. **Disconnect all cables from their connectors at the back of the computer.**
2. **Remove the expansion-card cage.**
3. **Disconnect all cables from the system board.**
4. **Remove the screw that secures the system board to the bottom of the chassis.**
5. **Slide the system board toward the front of the chassis until it stops.**
6. **Carefully lift the system board out of the chassis (be sure to lift evenly and not twist the system board).**

NOTES: If you are replacing the system board, remove all DIMMs, the video-memory upgrade module (if present), the single-edge contact (SEC) cartridge/ heat sink assembly, and the guide bracket assembly from the old system board and install them on the replacement board. Also, set the jumpers on the new system board so that they are identical to those on the old board, unless a microprocessor upgrade is being installed.

If the original system board has a NIC connector, ensure that the replacement board has a NIC connector.

When you reinstall the system board (before you slide the system board back to lock it in position), push down near each slot to engage the grounding clip

onto its corresponding tab. Push evenly on both sides of the system board as you slide it into position (do not twist the system board).

System Board Components

The subsections that follow Figure 5-18 contain procedures for removing/ replacing system board components.

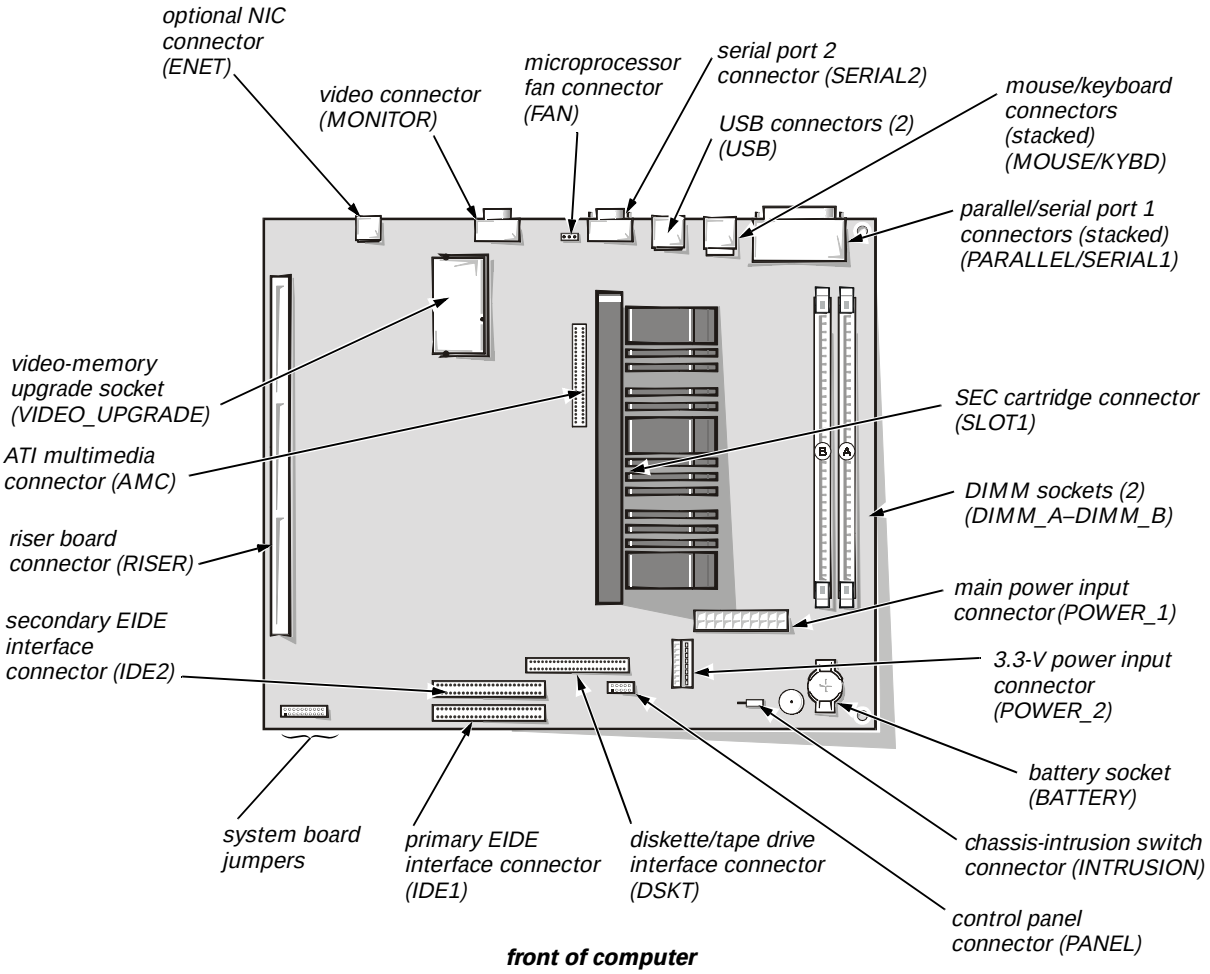

optional NIC connector (ENET)
video connector (MONITOR)
microprocessor fan connector (FAN)
serial port 2 connector (SERIAL2)
USB connectors (2) (USB)
mouse/keyboard connectors (stacked) (MOUSE/KYBD)
parallel/serial port 1 connectors (stacked) (PARALLEL/SERIAL1)
video-memory upgrade socket (VIDEO_UPGRADE)
ATI multimedia connector (AMC)
riser board connector (RISER)
secondary EIDE interface connector (IDE2)
SEC cartridge connector (SLOT1)
DIMM sockets (2) (DIMM_A–DIMM_B)
main power input connector (POWER_1)
3.3-V power input connector (POWER_2)
battery socket (BATTERY)
chassis-intrusion switch connector (INTRUSION)
control panel connector (PANEL)
system board jumpers
primary EIDE interface connector (IDE1)
diskette/tape drive interface connector (DSKT)
front of computer

Figure 5-18. System Board Components

DIMMs

To remove a DIMM from one of the two DIMM sockets, follow these steps:

1. **Locate the two DIMM sockets (see Figure 5-19).**
2. **To remove a DIMM, push outward on the DIMM socket's securing clips until the DIMM is released from its socket.**

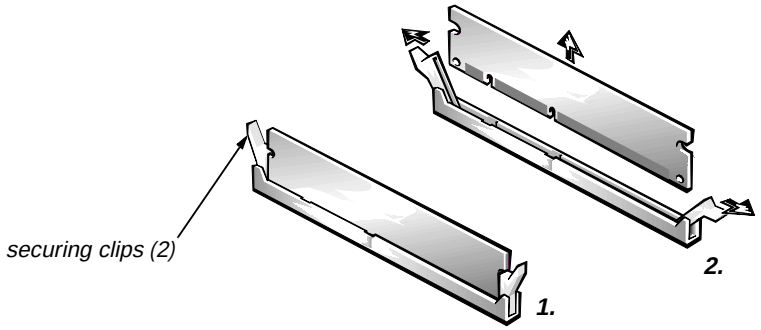


Figure 5-19. DIMM Removal

3. **Lift the DIMM away from the socket.**
4. **Reinstall the replacement DIMM by pressing the DIMM fully into the socket and then closing the securing clips to lock the DIMM into the socket.**

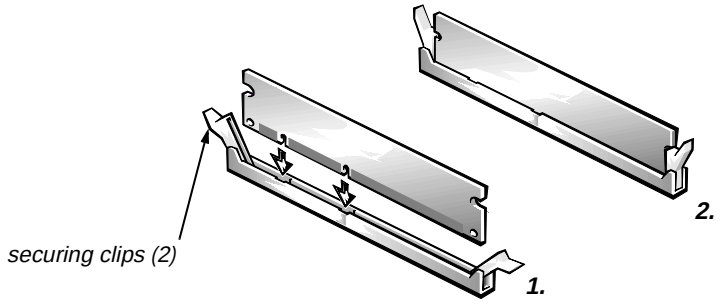


Figure 5-20. DIMM Installation

5. **Replace all assemblies and cables previously removed.**

Video Memory

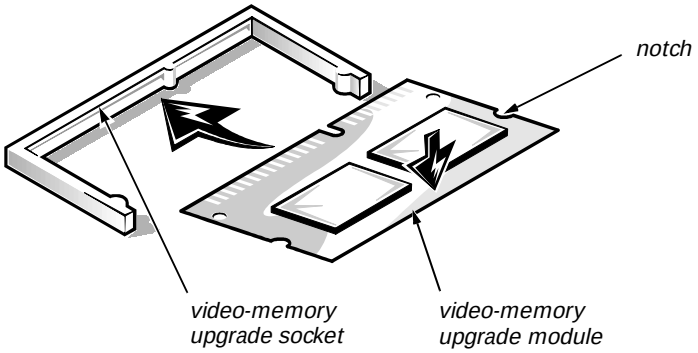


Figure 5-21. Installing a Video-Memory Upgrade Module

You can upgrade video memory from 2 to 4 MB by installing a video-memory upgrade module in the video-memory upgrade socket on the system board. Adding additional video memory increases the system's video performance and provides additional modes for high-resolution/expanded color applications.

To install the video memory upgrade, follow these steps:

1. **Remove the expansion-card cage.**

CAUTION: To avoid possible damage to the video-memory upgrade socket and/or video-memory upgrade module, the module is keyed and must be correctly positioned before inserting it into the socket.

2. **Orient the video-memory upgrade module as shown in Figure 5-21. Then carefully align the module's edge connector pins with the socket, ensuring that the slot in the module mates with the socket key.**

3. **Press the video-memory upgrade module firmly into the socket, and pivot the module downward until it clicks into place.**

   If you do not hear a sharp click when installing the video-memory upgrade module, remove the module and repeat steps 2 and 3.

4. **Replace the expansion-card cage.**

5. **Replace the computer cover, and reconnect the AC power cable to the AC outlet. Press the power button on the computer to reboot the system.**

   As the system boots, it automatically detects the presence of the new video-memory upgrade module and automatically changes the system configuration information in the System Setup program.

6. **Enter the System Setup program, and confirm that 4 MB is shown in the Video Memory category.**

   If the total memory is listed incorrectly, repeat steps 1 through 6 to reseat the video-memory upgrade module and verify that the computer acknowledges the module.

7. **Run the Video Test Group in the system diagnostics to test the new video-memory upgrade module.**

Microprocessor

To take advantage of future options in processor speed and functionality, you can replace the microprocessor on your system board with any Dell-supported microprocessor upgrade. The microprocessor upgrade kit is shipped with an SEC cartridge/heat sink assembly, which includes the microprocessor, microprocessor heat sink, and L2-cache memory module.

You may also have to reseat or replace an SEC cartridge/heat sink assembly during normal maintenance.

SEC Cartridge/Heat Sink Assembly

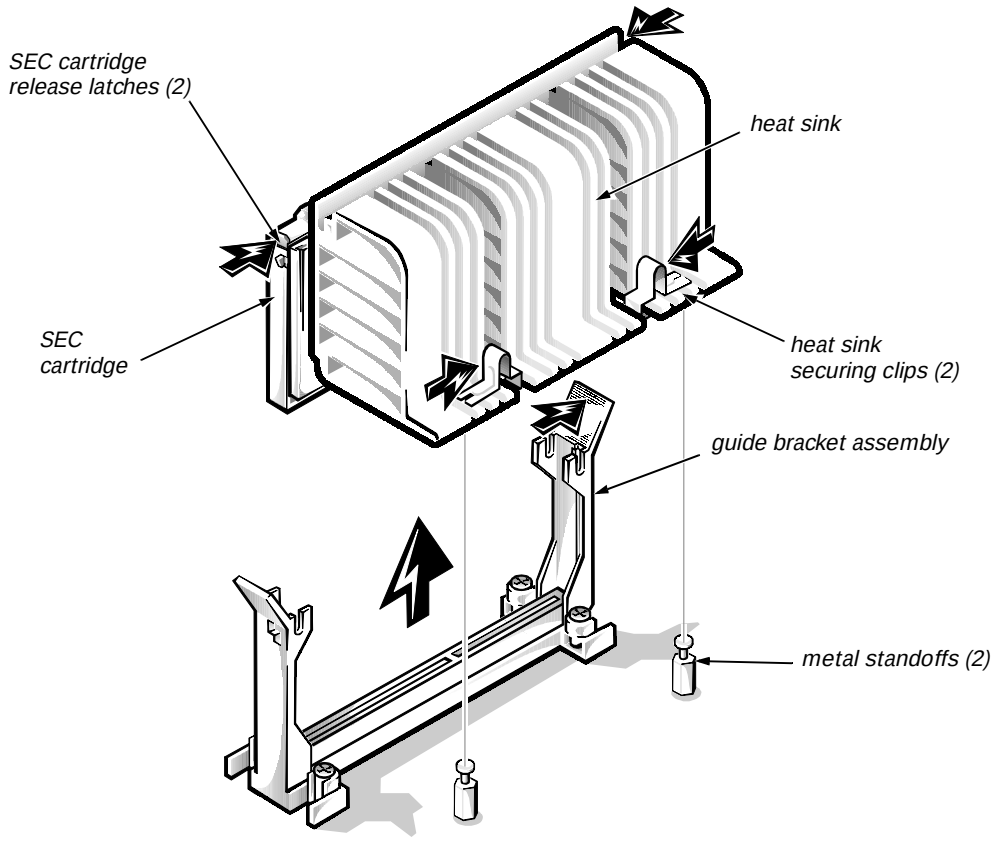


Figure 5-22. SEC Cartridge/Heat Sink Removal

To remove the SEC cartridge/heat sink assembly, follow these steps:

WARNING: The SEC cartridge/heat sink assembly can get extremely hot during system operations. Be sure that the assembly has had sufficient time to cool before touching it.

1. **Locate the SEC cartridge/heat sink assembly.**
2. **Disconnect the microprocessor fan connector from the 3-pin connector on the system board (labeled "FAN"), located between the SERIAL2 connector and the MONITOR connector (see Figure 5-18).**
3. **Release the two securing clips near the base of the heat sink from the metal standoffs.**
4. **Locate and press inward on the SEC cartridge release latches (located directly on top of the SEC cartridge adjacent to the heat sink assembly) until the latches click.**
5. **Lift the SEC cartridge/heat sink assembly out of its guide bracket assembly/connector on the system board.**

NOTE: When installing the SEC cartridge/heat sink assembly, carefully orient the assembly and press firmly with up to 25 pounds of force to mate the SEC cartridge with its connector. Then slide the SEC cartridge release latches outward to lock the assembly onto the metal standoffs.

System Battery

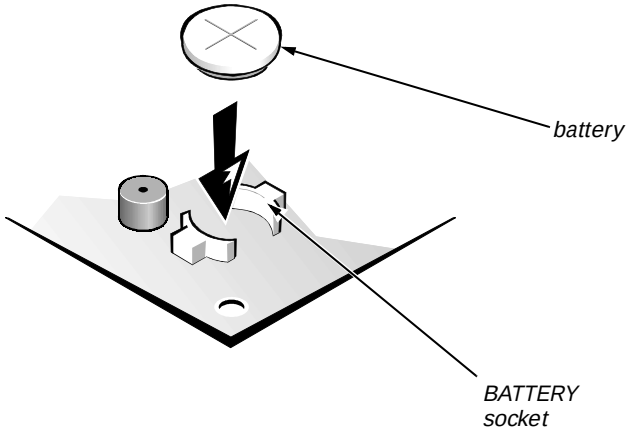


Figure 5-23. System Battery Installation

To remove the system battery, follow these steps:

1. **If possible, boot the system and enter the System Setup program. Then record important system configuration information (see Appendix A, "System Setup Program," for details).**

2. **Turn off power to all peripherals, and disconnect the AC power cable from its AC outlet.**

3. **Remove the computer cover.**

4. **Remove the expansion-card cage, and locate the battery in the front-right corner of the system board adjacent to the DIMM connectors (see Figure 5-18).**

CAUTION: If you pry out the battery with a blunt object, be careful not to touch the system board with the object. Ensure that the object is inserted between the battery and the socket before attempting to pry out the battery. Otherwise, you may damage the system board by prying off the socket or by breaking traces on the system board.

5. **Remove the battery by carefully prying it out of its socket with your fingers or with a blunt, nonconducting object, such as a plastic screwdriver.**

WARNING
WARNING: There is a danger of the new battery exploding if it is incorrectly installed. When you replace the system battery, orient the new battery with the "+" facing up (see Figure 5-23). Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

6. **Insert the battery into the socket (with the positive side labeled "+" facing upwards), and snap it into place.**

7. **Replace the expansion-card cage, reconnect all cabling, replace the computer cover, and reboot the system.**

8. **Enter the System Setup program, and configure the system using the information from the printouts you made earlier.**

9. **Turn off the computer; wait 10 or more minutes, and then reenter the System Setup program to ensure that the date and time are still correct, indicating that the system battery is functioning correctly.**

CHAPTER 6
Removing and Replacing Parts on the Mini Tower Chassis

This chapter provides procedures for removing the components, assemblies, and subassemblies in the Dell OptiPlex G1 mini tower computer. If you are servicing a low-profile or midsize chassis, use Chapter 4 or 5, as appropriate for your system.

Unless otherwise noted, each procedure assumes the following:

- You have performed the steps in "Precautionary Measures" found later in this chapter.
- You have removed the computer cover.
- You can replace or reinstall a part by performing the removal procedure in reverse order unless additional information is provided.

Recommended Tools

Most of the procedures in this chapter require the use of one or more of the following tools:

- Small flat-blade screwdriver
- Wide flat-blade screwdriver
- #1 and #2 Phillips screwdrivers
- 1/4-inch nutdriver
- Tweezers or long-nose pliers

Also, use a wrist grounding strap as explained in the next section, "Precautionary Measures."

Precautionary Measures

Before you perform any of the procedures in this chapter, take a few moments to read the following warning for your personal safety and to prevent damage to the system from ESD.

WARNING FOR YOUR PERSONAL SAFETY AND PROTECTION OF THE EQUIPMENT

Before you start to work on the system, perform the following steps in the sequence listed:

1. **Turn off the computer and any attached peripherals.**
2. **Disconnect the computer and any attached peripherals from their power sources to reduce the potential for personal injury. Also, disconnect any telephone or telecommunication lines from the computer.**
3. **Wait 5 seconds after powering down the computer before disconnecting a peripheral from the computer or removing a component from the computer's system board to avoid possible damage to the system board.**

Wear a wrist grounding strap, and clip it to an unpainted metal surface, such as the padlock loop on the back of the chassis. If a wrist grounding strap is not available, periodically touch an unpainted metal surface on the back of the computer to discharge any static charge from your body. Avoid touching components and contacts on a card, and avoid touching pins on a chip to prevent static electricity damage.

Inside the Computer

Figure 6-1 shows an internal view of the interior of the mini tower computer and identifies major components for orientation. Refer to this illustration, as needed, when performing the component removal/replacement procedures in this chapter.

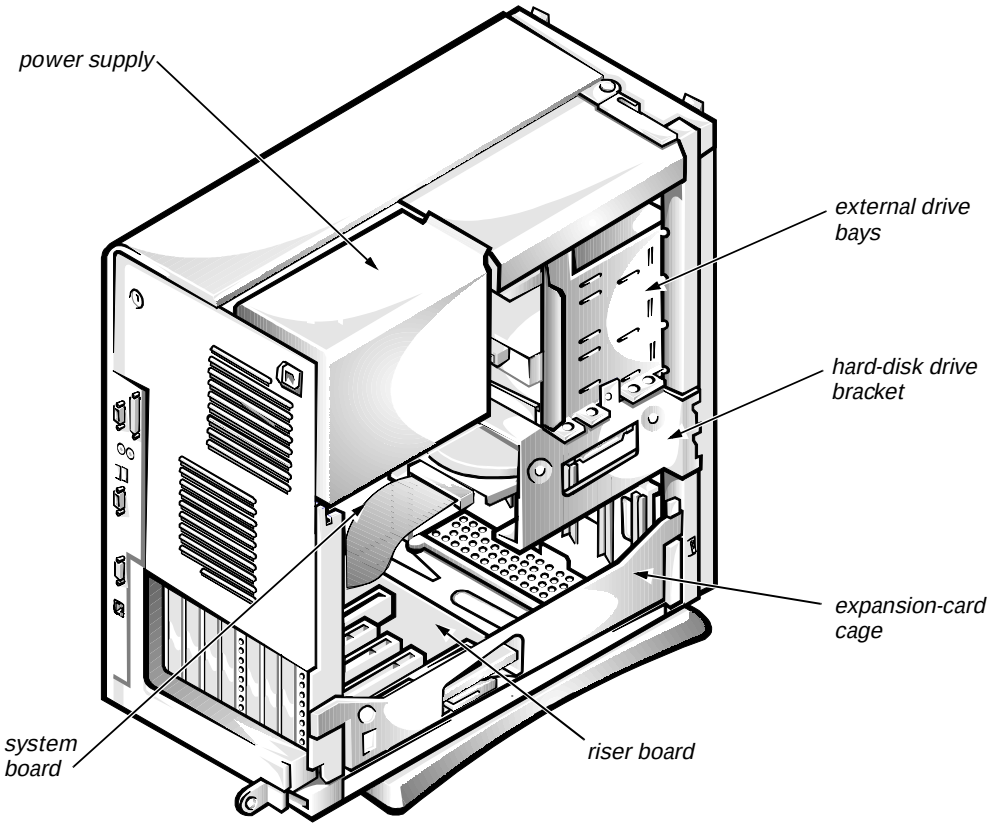


Figure 6-1. Internal View of the Mini Tower Computer

Computer Cover

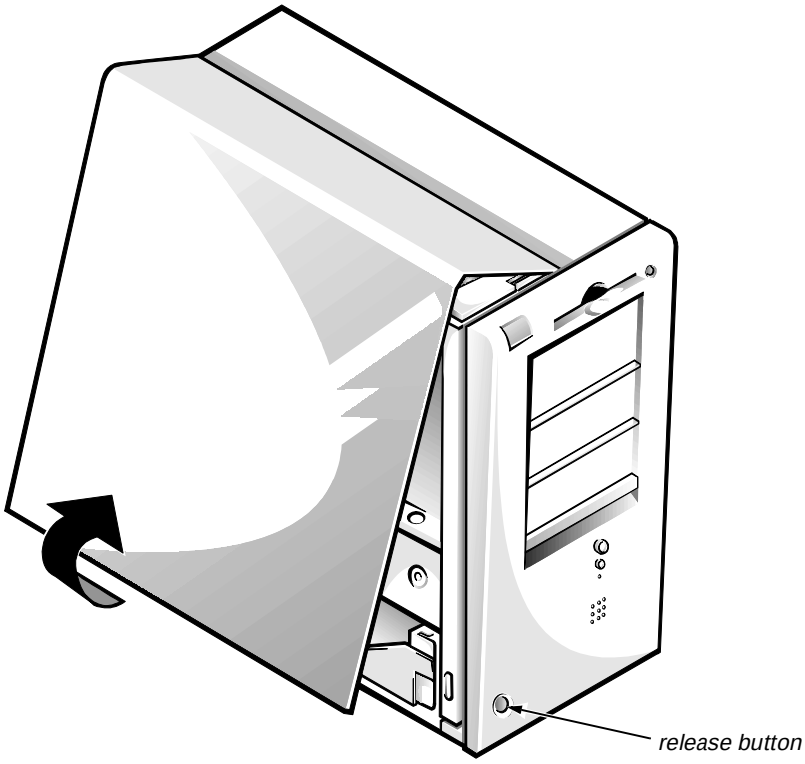


Figure 6-2. Computer Cover Removal

To remove the computer cover, follow these steps:

1. **Turn off power to all peripherals, and disconnect the AC power cable from its AC outlet.**
2. **Remove the padlock if one is installed.**
3. **Facing the left side of the computer, press the release button at the bottom-left corner of the front bezel.**
4. **Lift the bottom of the cover, allowing it to pivot up toward you.**
5. **Disengage the tabs that secure the cover to the top of the chassis, and lift the cover away.**

Before you reinstall the cover, fold all cables out of the way so that they do not interfere with the cover or with proper airflow inside the computer.

NOTE: After removing and replacing the chassis, the chassis intrusion detector alerts you that the cover has been removed. Refer to "Chassis Intrusion Detection" in Chapter 1 for instructions on resetting the chassis intrusion detector.

Front Bezel

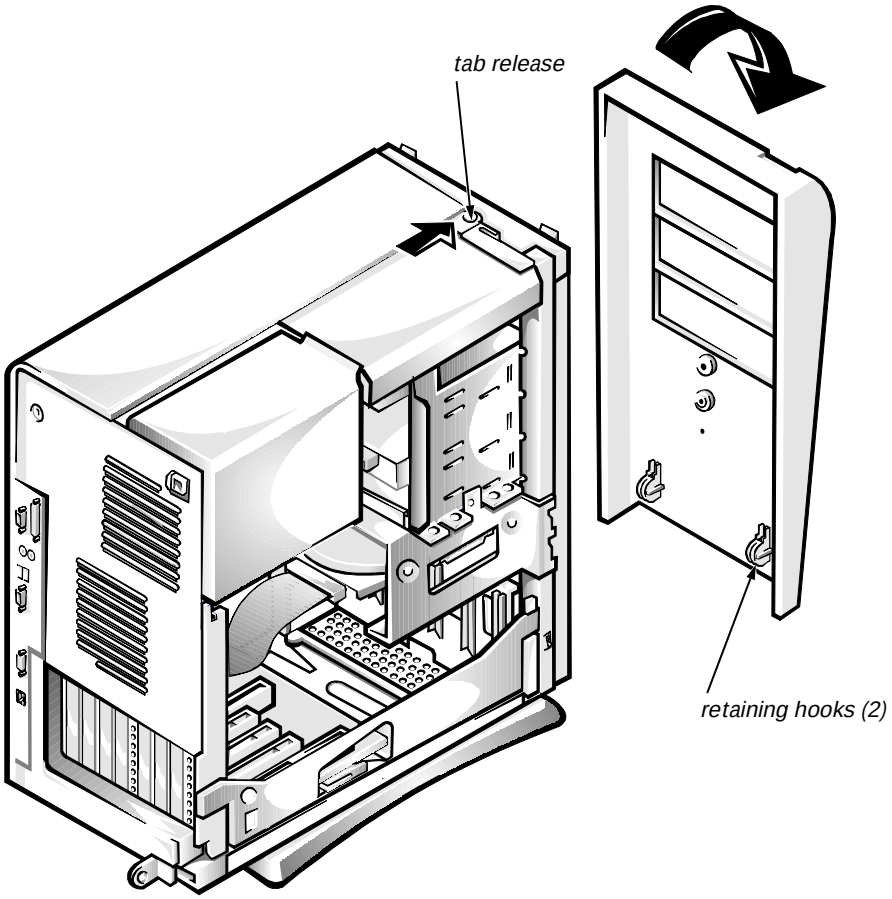


Figure 6-3. Front-Bezel Removal

To remove the front bezel, follow these steps:

1. **Press the tab release marked with the icon.**
2. **Tilt the bezel away from the chassis.**
3. **Disengage the two retaining hooks at the bottom of the bezel, and pull the bezel away from the chassis.**

Eject, Power, and Reset Buttons

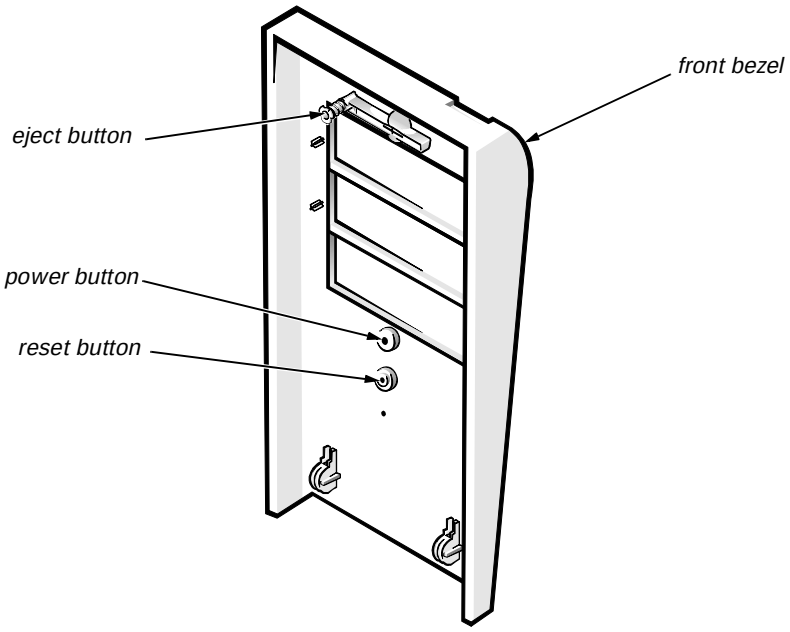


Figure 6-4. Eject, Power, and Reset Button Removal

To remove the eject, power, and reset buttons, follow these steps:

1. **Lay the front bezel on a flat work surface, with the back of the bezel facing up.**
2. **To remove the 3.5-inch diskette-drive eject button, pull gently on the plastic part of the button until it comes free.**
3. **To remove the power button or the reset button, use a small screwdriver and push in on the two or three plastic clips that hold the button to the bezel.**

   When these clips are released, the button comes free from the bezel.

Front-Panel Inserts

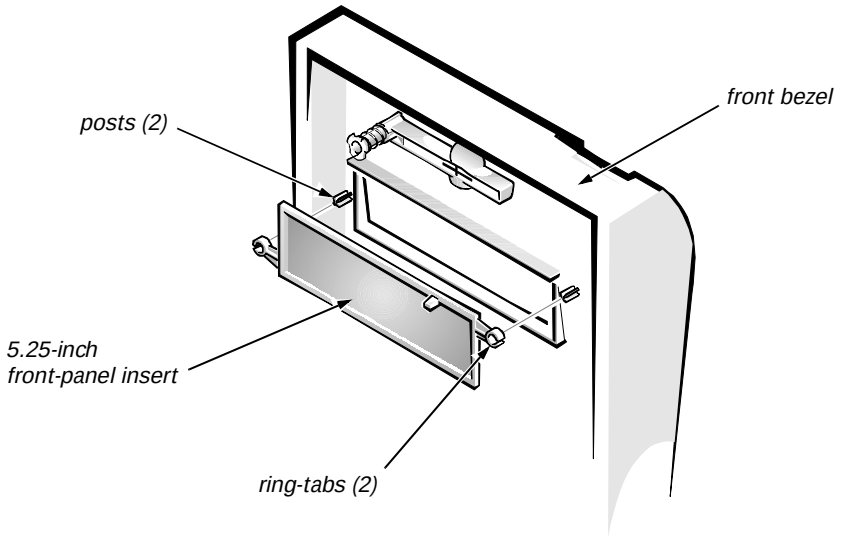


Figure 6-5. 5.25-Inch Front-Panel Insert Removal

To remove a 5.25-inch front-panel insert, follow these steps:

1. **Hold the bezel with the front facing you.**
2. **From the front of the bezel, use your thumbs to press inward on the insert until it slides off the two posts.**

To replace a 5.25-inch front-panel insert, position the two ring-tabs over the posts on the inside of the bay opening, and then press the ring-tabs over the posts.

Control Panel

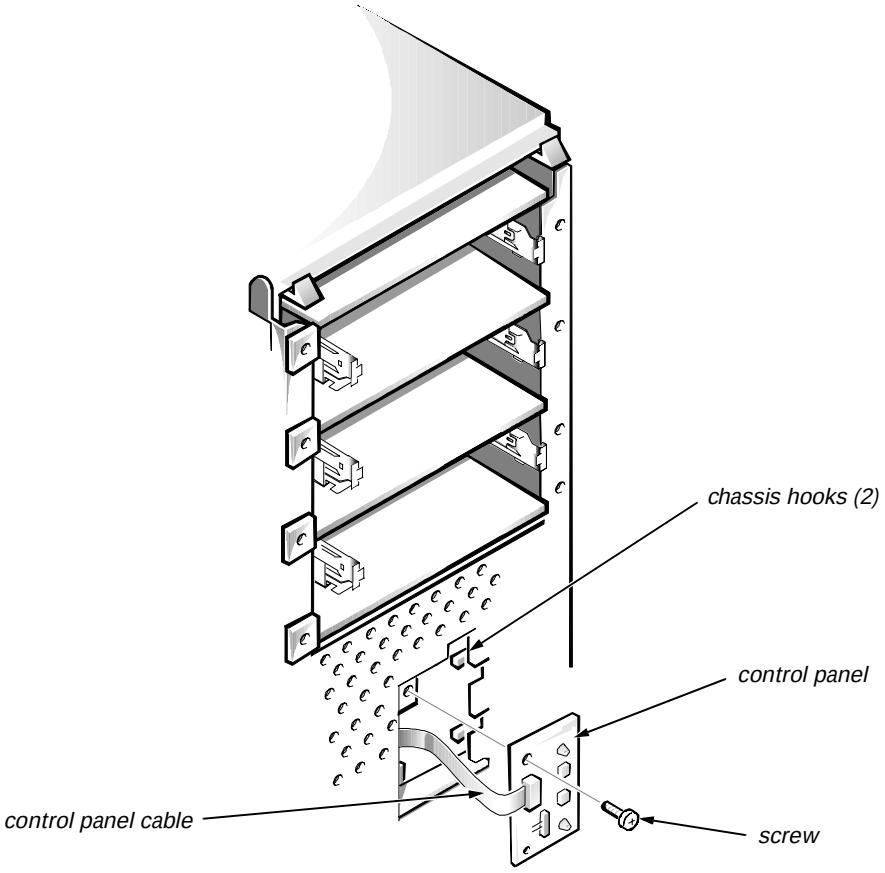


Figure 6-6. Control Panel Removal

To remove the control panel, follow these steps:

1. **Remove the hard-disk drive bracket.**
2. **Disconnect the control panel cable from the PANEL connector on the system board (see Figure 6-20).**
3. **Remove the mounting screw holding the control panel to the chassis.**
4. **Slide the control panel out of the hooks holding it to the chassis.**

   Note the routing of the control panel cable as you remove it from the chassis.

Drives

Figure 6-8 shows an example of drive hardware that can be installed in the computer. Refer to this figure when you perform any of the procedures in the following subsections.

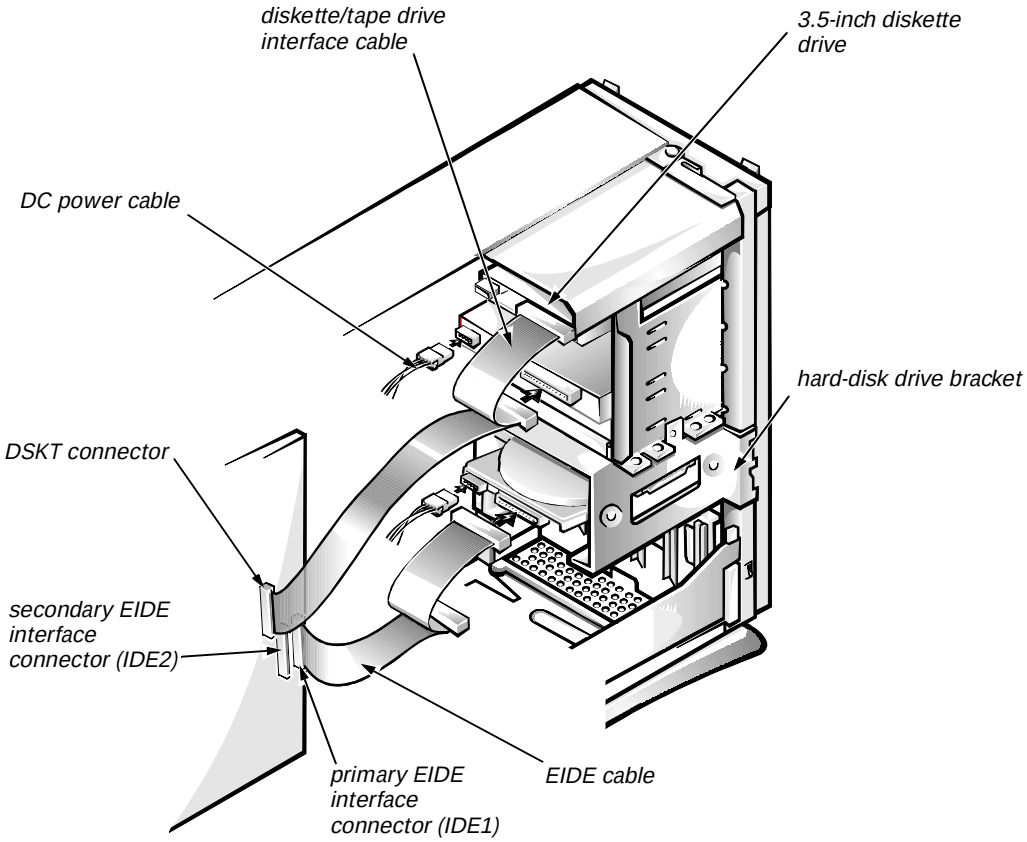


Figure 6-7. Drive Hardware

Externally Accessible Drive Assemblies

The following subsections contain removal/replacement procedures for drives installed in the externally accessible drive bays.

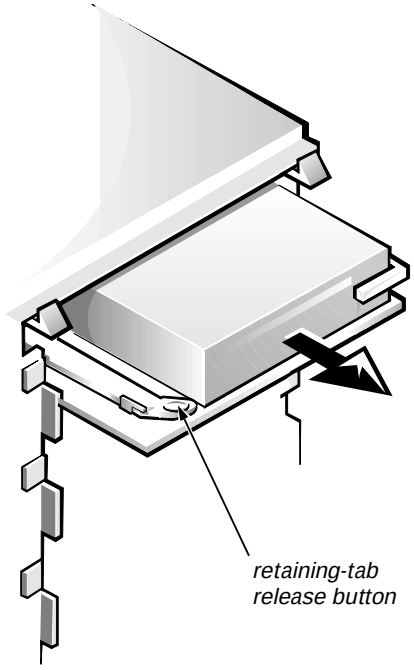


Figure 6-8. 3.5-Inch Diskette-Drive Assembly Removal

To remove a 3.5-inch diskette drive assembly, follow these steps:

1. **Disconnect the DC power cable and the interface cable from the back of the 3.5-inch diskette drive.**
2. **Press the retaining-tab release button, and pull the drive assembly forward to remove it.**
3. **Remove the drive-mounting screw from the left side of the drive, and remove the drive from the bracket (see Figure 6-9).**

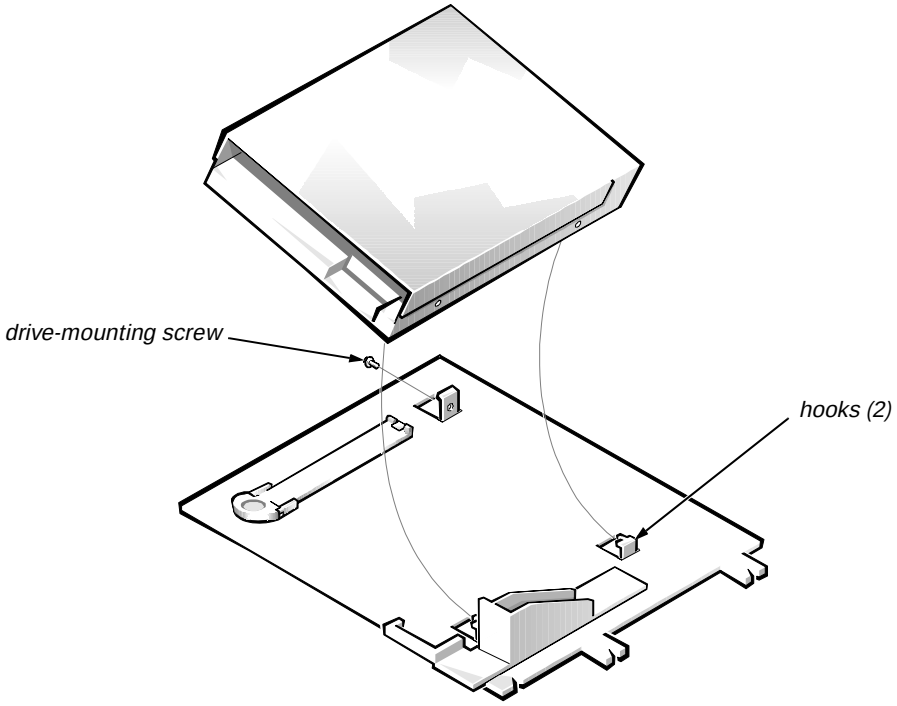


Figure 6-9. 3.5-Inch Diskette Drive Bracket

When you replace the 3.5-inch diskette drive, be sure that the two hooks on the right side of the bracket engage the mounting holes in the side of the 3.5-inch diskette drive.

5.25-Inch Drive Assembly

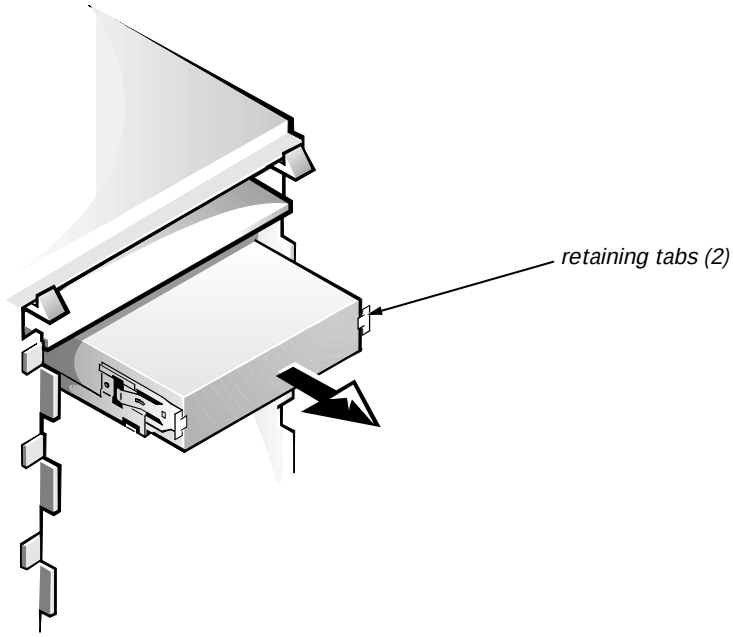


Figure 6-10. 5.25-Inch Drive Assembly Removal

To remove a 5.25-inch drive assembly from the middle or lower drive bay, follow these steps:

1. **Disconnect the DC power cable and the interface cable from the back of the drive.**

2. **Press in on the two retaining tabs (one on each side of the drive), and slide the drive assembly forward to remove it.**

3. **Remove the four screws attaching the 5.25-inch drive to the mounting plate, and lift the drive out of the mounting plate (see Figure 6-11).**

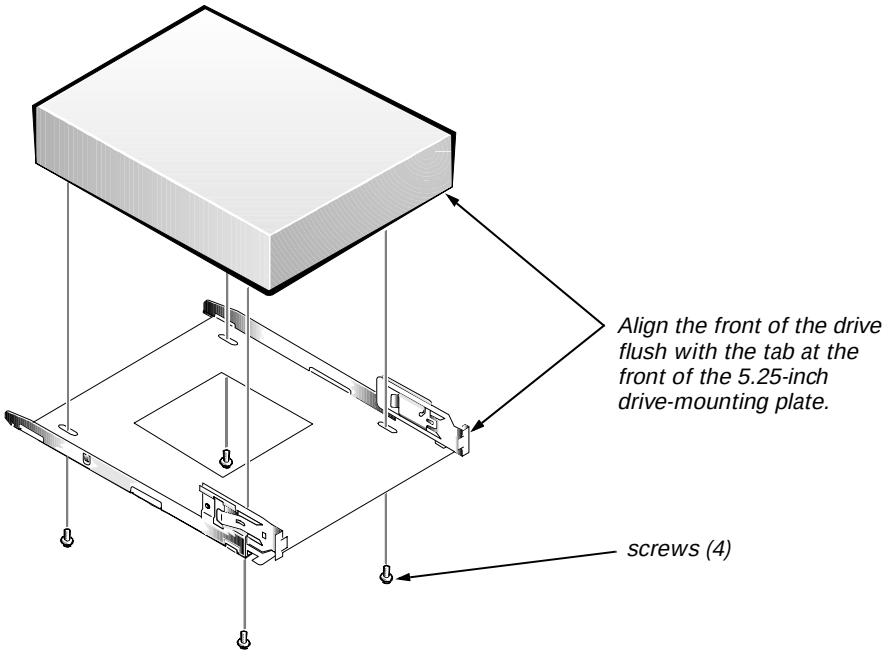


Figure 6-11. 5.25-Inch Drive Removal

When you replace the 5.25-inch drive, align the front of the drive flush with the tab at the front of the mounting plate. Insert the four screws, and tighten them in the order stamped on the bottom of the 5.25-inch drive-mounting plate.

Hard-Disk Drive Bracket

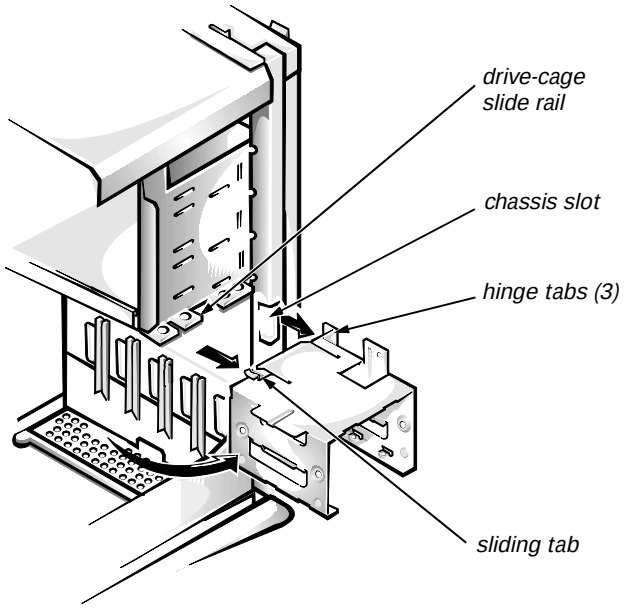


Figure 6-12. Hard-Disk Drive Bracket Removal

To remove the hard-disk drive bracket, follow these steps:

1. **Disconnect the DC power cable and the interface cable from the back of each hard-disk drive installed in the hard-disk drive bracket.**
2. **Remove the screw that secures the hard-disk drive bracket to the drive cage in the chassis.**
3. **Grasp the bracket, and rotate it outward from the chassis until the sliding tab clears the slide rail on the drive cage.**
4. **Lift up the hard-disk drive bracket slightly to free the hinge tabs and remove it from the computer.**

When you reinstall the hard-disk drive bracket, insert the bracket's hinge tabs into the chassis slot so that the tabs hook over the slot. Then rotate the bracket toward the drive cage, and fit the bracket's sliding tab onto the drive-cage slide rail.

Hard-Disk Drive

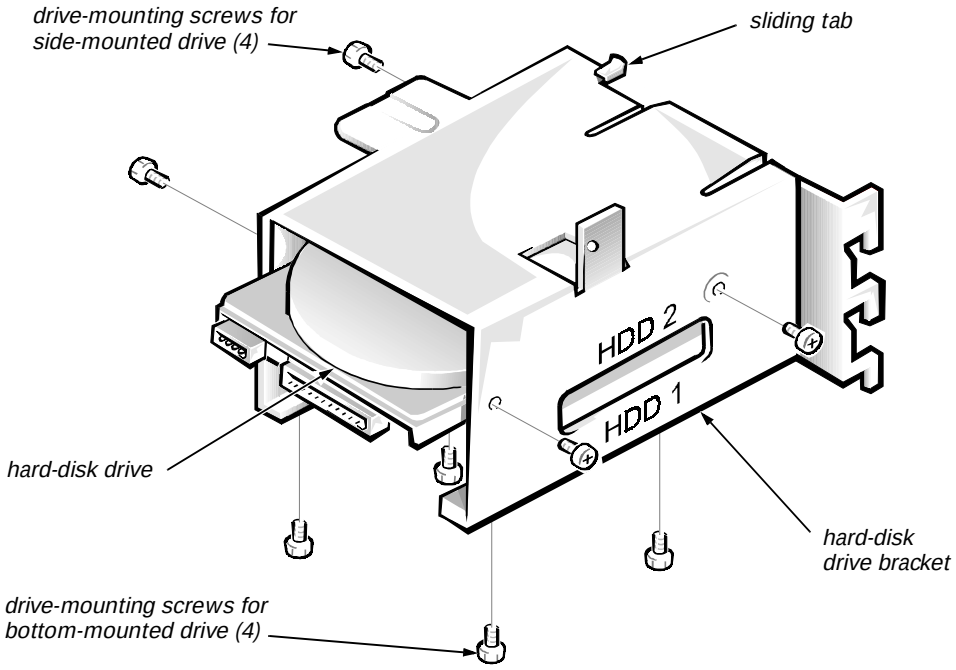


Figure 6-13. Hard-Disk Drive Removal

To remove the hard-disk drive assembly, follow these steps:

1. **Remove the hard-disk drive bracket.**
2. **Remove the four screws that attach the hard-disk drive to the hard-disk drive bracket.**

   One hard-disk drive attaches to the hard-disk drive bracket at the sides of the drive. The other hard-disk drive attaches to the hard-disk drive bracket at the bottom of the hard-disk drive.
3. **Slide the drive out of the hard-disk drive bracket.**

System Power Supply

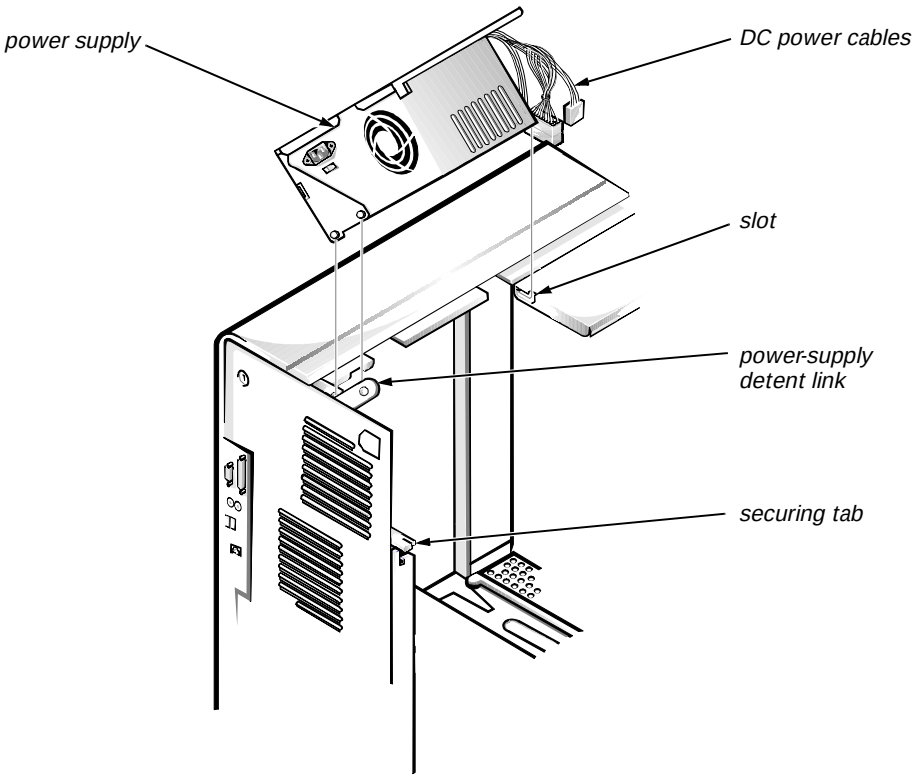


Figure 6-14. System Power-Supply Removal

To remove the system power supply, follow these steps:

1. **Disconnect the AC power cable from the back of the system power supply.**

2. **Free the system power supply from the securing tab labeled "RELEASE —>," and rotate it upward until it locks.**

   Press the securing tab to release the power supply.

3. **Disconnect the DC power cables from the system board and the drives.**

4. **Facing the left side of the computer, move the front end of the system power supply toward you, and lift it up to disengage the power supply from the slot in the chassis.**

5. **Lift the system power supply from the computer.**

When you reinstall the system power supply, place the power-supply detent link over the pin on the power supply as you position the power supply in the chassis opening.

Expansion Cards

The computer has a removable expansion-card cage. The expansion-card cage contains the riser board and any installed expansion cards. Dell recommends that you remove the expansion-card cage first before removing or installing expansion cards.

If you are not removing any expansion cards, leave the external cables attached to them.

Expansion-Card Cage

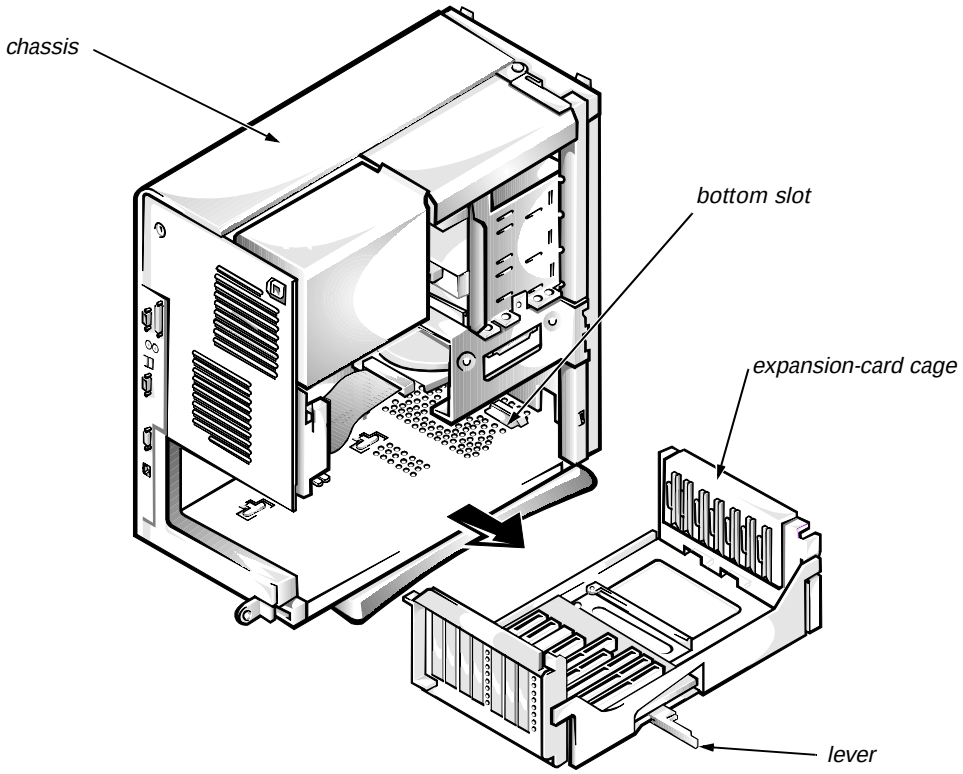


Figure 6-15. Expansion-Card Cage Removal

To remove the expansion-card cage, follow these steps:

1. **Rotate the lever toward the back of the computer until it stops in the upright position.**

2. **Slide the expansion-card cage out of the computer.**

To replace the expansion-card cage, align the tabs on the left and right sides of the expansion-card cage with the slots on the back and bottom of the chassis. With the securing lever in its extended position, slide the expansion-card cage into place.

Expansion Card

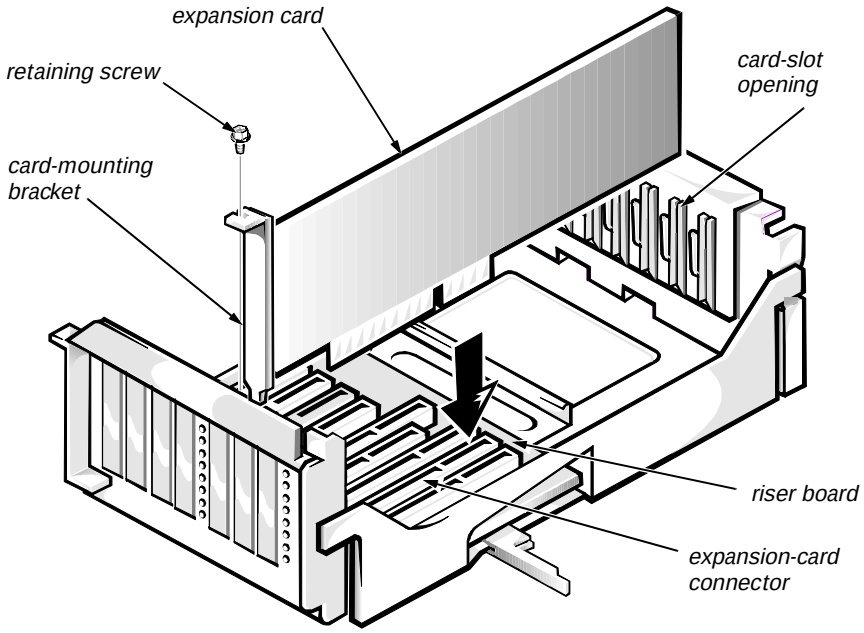


Figure 6-16. Expansion-Card Removal

To remove an expansion card, follow these steps:

1. **Disconnect any cables from the expansion card being removed.**
2. **Remove the expansion-card cage.**
3. **Remove the retaining screw from the card-mounting bracket.**
4. **Grasp the expansion card by its corners, and carefully remove it from the expansion-card connector.**

Riser Board

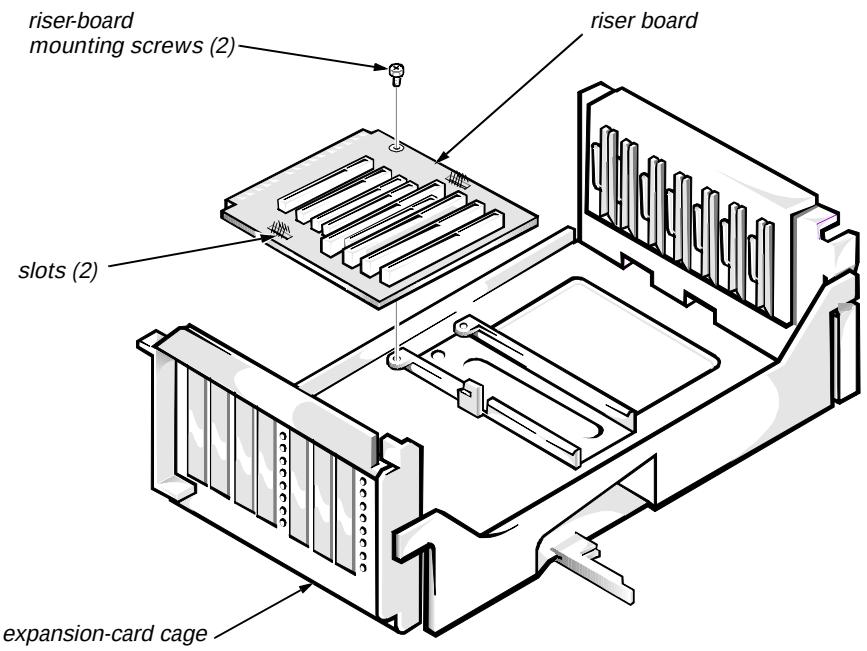


Figure 6-17. Riser Board Removal

To remove the riser board, follow these steps:

1. **Remove the expansion-card cage and all expansion cards.**
2. **Place the expansion-card cage on a flat work surface with the riser board facing up.**
3. **Remove the riser-board mounting screws.**
4. **Slide the riser board away from the release handle until it stops; then lift the riser board away from the expansion-card cage.**

System Board

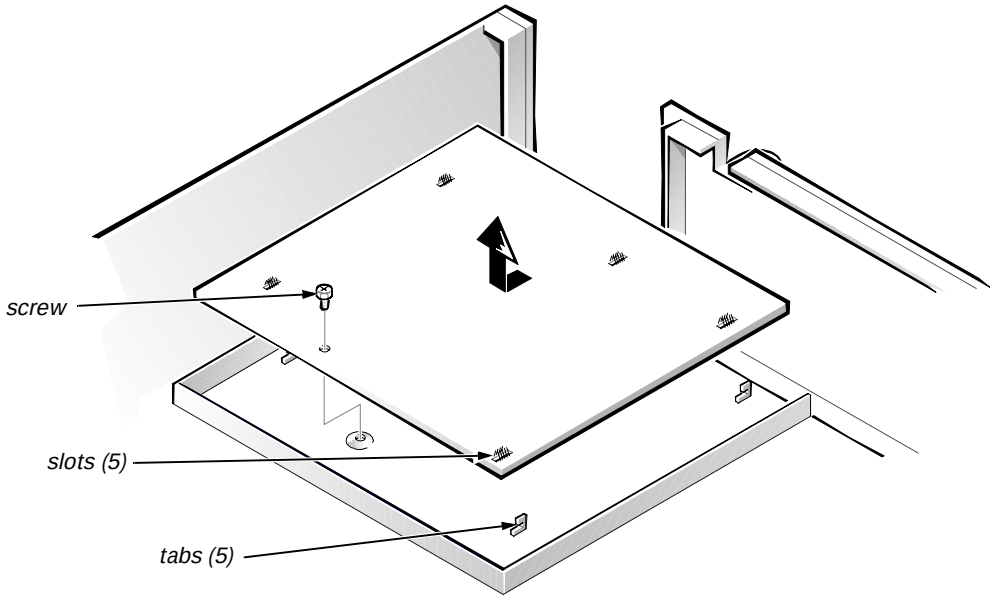


Figure 6-18. System Board Removal

To remove the system board, follow these steps:

1. **Disconnect all cables from their connectors at the back of the computer.**
2. **Remove the expansion-card cage.**
3. **Disconnect all cables from the system board.**
4. **Remove the screw that secures the system board to the bottom of the chassis.**
5. **Slide the system board toward the front of the chassis until it stops.**
6. **Carefully lift the system board out of the chassis (be sure to lift evenly and not twist the system board).**

NOTES: If you are replacing the system board, remove all DIMMs, the video-memory upgrade module (if present), the single-edge contact (SEC) cartridge/ heat sink assembly, and the guide bracket assembly from the old system board and install them on the replacement board. Also, set the jumpers on the new system board so that they are identical to those on the old board, unless a microprocessor upgrade is being installed.

If the original system board has a NIC connector, ensure that the replacement board has a NIC connector.

When you reinstall the system board (before you slide the system board back to lock it in position), push down near each slot to engage the grounding clip

onto its corresponding tab. Push evenly on both sides of the system board as you slide it into position (do not twist the system board).

System Board Components

The subsections that follow Figure 6-19 contain procedures for removing/replacing system board components.

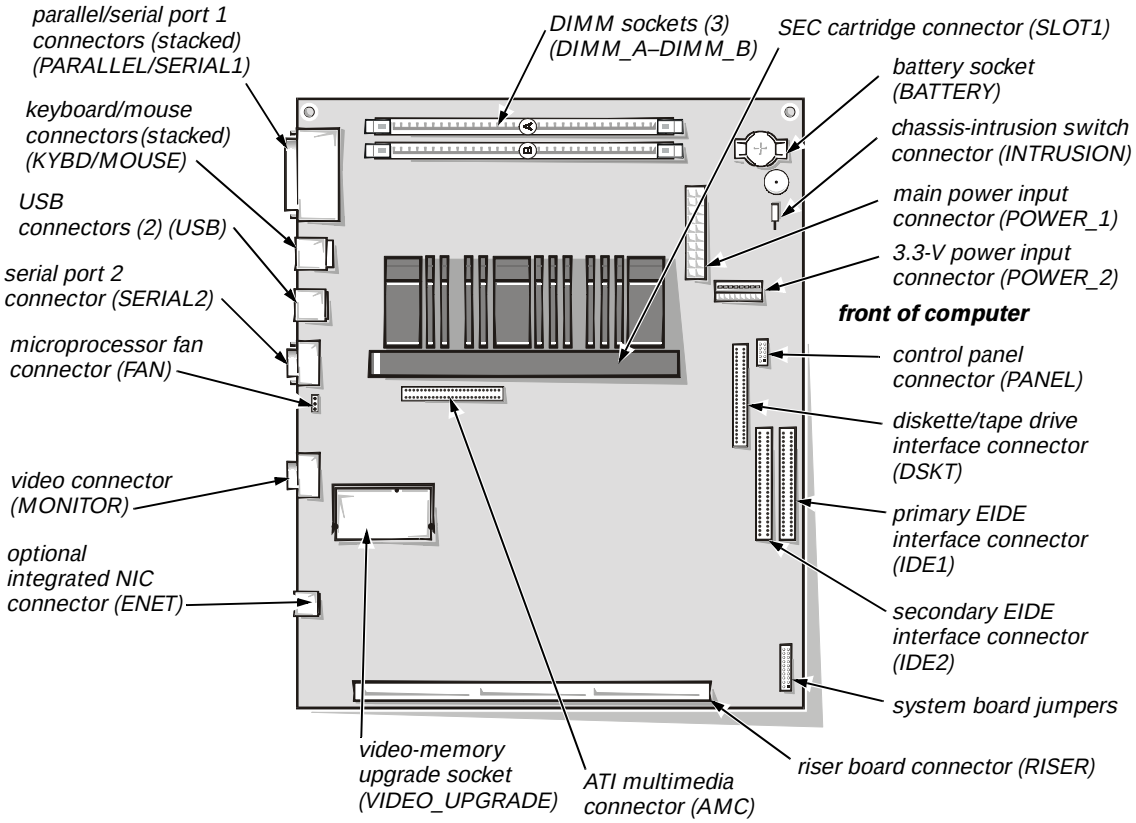

parallel/serial port 1 connectors (stacked) (PARALLEL/SERIAL1)
keyboard/mouse connectors (stacked) (KYBD/MOUSE)
USB connectors (2) (USB)
serial port 2 connector (SERIAL2)
microprocessor fan connector (FAN)
video connector (MONITOR)
optional integrated NIC connector (ENET)
DIMM sockets (3) (DIMM_A–DIMM_B)
SEC cartridge connector (SLOT1)
battery socket (BATTERY)
chassis-intrusion switch connector (INTRUSION)
main power input connector (POWER_1)
3.3-V power input connector (POWER_2)
front of computer
control panel connector (PANEL)
diskette/tape drive interface connector (DSKT)
primary EIDE interface connector (IDE1)
secondary EIDE interface connector (IDE2)
system board jumpers
riser board connector (RISER)
video-memory upgrade socket (VIDEO_UPGRADE)
ATI multimedia connector (AMC)

Figure 6-19. System Board Components

DIMMs

To remove a DIMM from one of the two DIMM sockets, follow these steps:

1. **Locate the two DIMM sockets (see Figure 6-20).**
2. **To remove a DIMM, push outward on the DIMM socket's securing clips until the DIMM is released from its socket.**

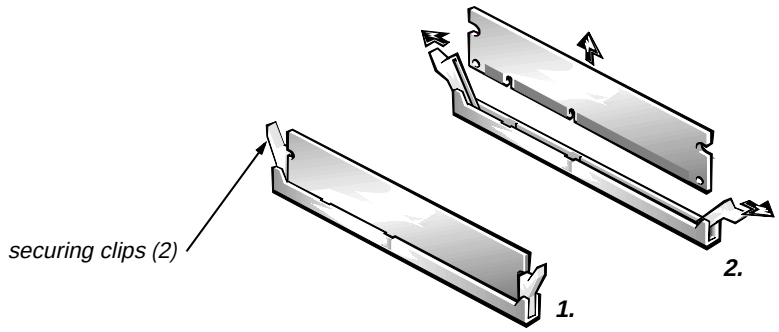


Figure 6-20. DIMM Removal

3. **Lift the DIMM away from the socket.**
4. **Reinstall the replacement DIMM by pressing the DIMM fully into the socket and then closing the securing clips to lock the DIMM into the socket.**

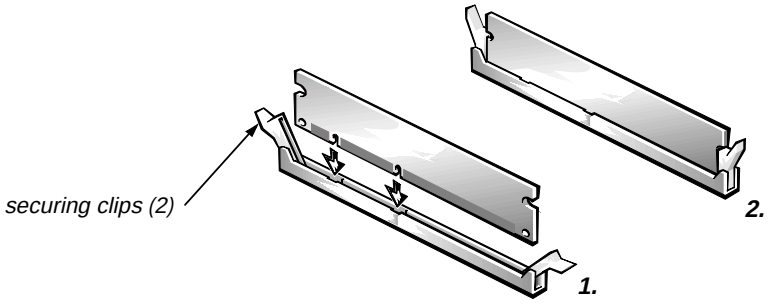


Figure 6-21. DIMM Installation

5. **Replace all assemblies and cables previously removed.**

Video Memory

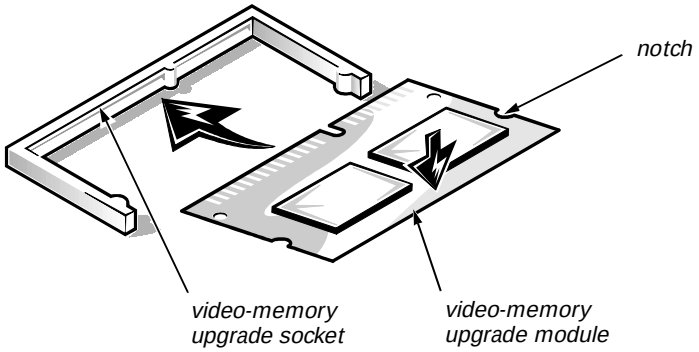


Figure 6-22. Installing a Video-Memory Upgrade Module

You can upgrade video memory from 2 to 4 MB by installing a video-memory upgrade module in the video-memory upgrade socket on the system board. Adding additional video memory increases the system's video performance and provides additional modes for high-resolution/expanded color applications.

To install the video memory upgrade, follow these steps:

1. **Remove the expansion-card cage.**

CAUTION: To avoid possible damage to the video-memory upgrade socket and/or video-memory upgrade module, the module is keyed and must be correctly positioned before inserting it into the socket.

2. **Orient the video-memory upgrade module as shown in Figure 6-23. Then carefully align the module's edge connector pins with the socket, ensuring that the slot in the module mates with the socket key.**

3. **Press the video-memory upgrade module firmly into the socket, and pivot the module downward until it clicks into place.**

   If you do not hear a sharp click when installing the video-memory upgrade module, remove the module and repeat steps 2 and 3.

4. **Replace the expansion-card cage.**

5. **Replace the computer cover, and reconnect the AC power cable to the AC outlet. Press the power button on the computer to reboot the system.**

   As the system boots, it automatically detects the presence of the new video-memory upgrade module and automatically changes the system configuration information in the System Setup program.

6. **Enter the System Setup program, and confirm that 4 MB is the value for the Video Memory option.**

   If the total memory is listed incorrectly, repeat steps 1 through 6 to reseat the video-memory upgrade module and verify that the computer acknowledges the module.

7. **Run the Video Test Group in the system diagnostics to test the new video-memory upgrade module.**

Microprocessor

To take advantage of future options in processor speed and functionality, you can replace the microprocessor on your system board with any Dell-supported microprocessor upgrade. The microprocessor upgrade kit is shipped with an SEC cartridge/heat sink assembly which includes the microprocessor, microprocessor heat sink, and L2-cache memory module.

You may also have to reseat or replace an SEC cartridge/heat sink assembly during normal maintenance.

SEC Cartridge/Heat Sink Assembly

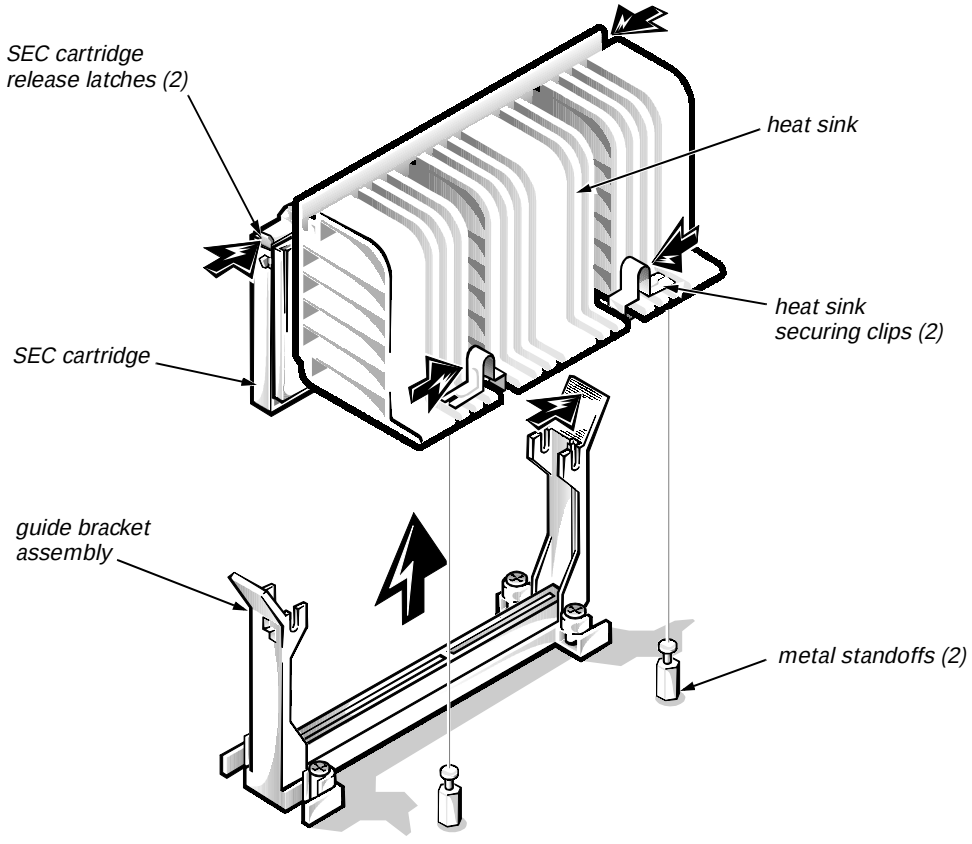


Figure 6-23. SEC Cartridge/Heat Sink Removal

To remove the SEC cartridge/heat sink assembly, follow these steps:

WARNING: The SEC cartridge/heat sink assembly can get extremely hot during system operations. Be sure that the assembly has had sufficient time to cool before touching it.

1. **Locate the SEC cartridge/heat sink assembly.**
2. **Disconnect the microprocessor fan connector from the 3-pin connector on the system board (labeled "FAN"), located between the SERIAL2 connector and the MONITOR connector (see Figure 6-19).**
3. **Release the two securing clips near the base of the heat sink from the metal standoffs.**
4. **Locate and press inward on the SEC cartridge release latches (located directly on top of the SEC cartridge adjacent to the heat sink assembly) until the latches click.**
5. **Lift the SEC cartridge/heat sink assembly out of its guide bracket assembly/connector on the system board.**

NOTE: When installing the SEC cartridge/heat sink assembly, carefully orient the assembly and press firmly with up to 25 pounds of force to mate the SEC cartridge with its connector. Then slide the SEC cartridge release latches outward to lock the assembly onto the metal standoffs.

System Battery

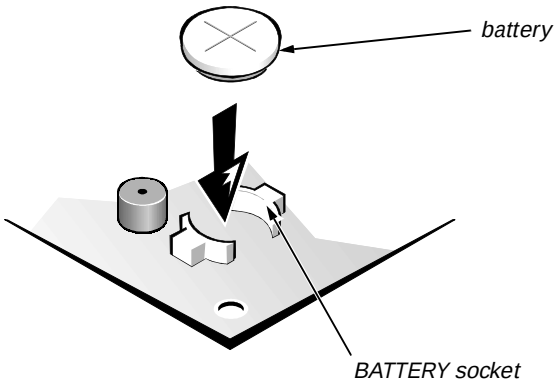


Figure 6-24. System Battery Installation

To remove the system battery, follow these steps:

1. **If possible, boot the system and enter the System Setup program. Then record important system configuration information (see Appendix A, "System Setup Program," for details).**
2. **Turn off power to all peripherals, and disconnect the AC power cable from its AC outlet.**

3. **Remove the computer cover.**

4. **Remove the expansion-card cage, and locate the battery in the front-right corner of the system board adjacent to the DIMM connectors (see Figure 6-19).**

CAUTION: If you pry out the battery with a blunt object, be careful not to touch the system board with the object. Ensure that the object is inserted between the battery and the socket before attempting to pry out the battery. Otherwise, you may damage the system board by prying off the socket or by breaking traces on the system board.

5. **Remove the battery by carefully prying it out of its socket with your fingers or with a blunt, nonconducting object, such as a plastic screwdriver.**

WARNING
WARNING: There is a danger of the new battery exploding if it is incorrectly installed. When you replace the system battery, orient the new battery with the "+" facing up (see Figure 6-25). Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

6. **Insert the battery into the socket (with the positive side labeled "+" facing upwards) into its socket, and snap it into place.**

7. **Replace the expansion-card cage, reconnect all cabling, replace the computer cover, and reboot the system.**

8. **Enter the System Setup program, and configure the system using the information from the printouts you made earlier.**

9. **Turn off the computer; wait 10 or more minutes and reenter the System Setup program to ensure that the date and time are still correct, indicating that the system battery is functioning correctly.**

APPENDIX A
System Setup Program

This appendix, which applies to all Dell OptiPlex G1 Managed PC computer families, describes the System Setup program, which is used to change the system configuration information stored in NVRAM on the system board.

To enter the System Setup program, follow these steps:

1. **Turn on (or reboot) the system.**
2. **Press <F2> when the prompt appears in the upper right corner of the Dell logo screen.**

If you wait too long and the operating system begins to load into memory, *let the system complete the load operation*; then shut down the system and try again.

NOTE: To ensure an orderly system shutdown, consult the documentation that accompanied the operating system.

System Setup Screen

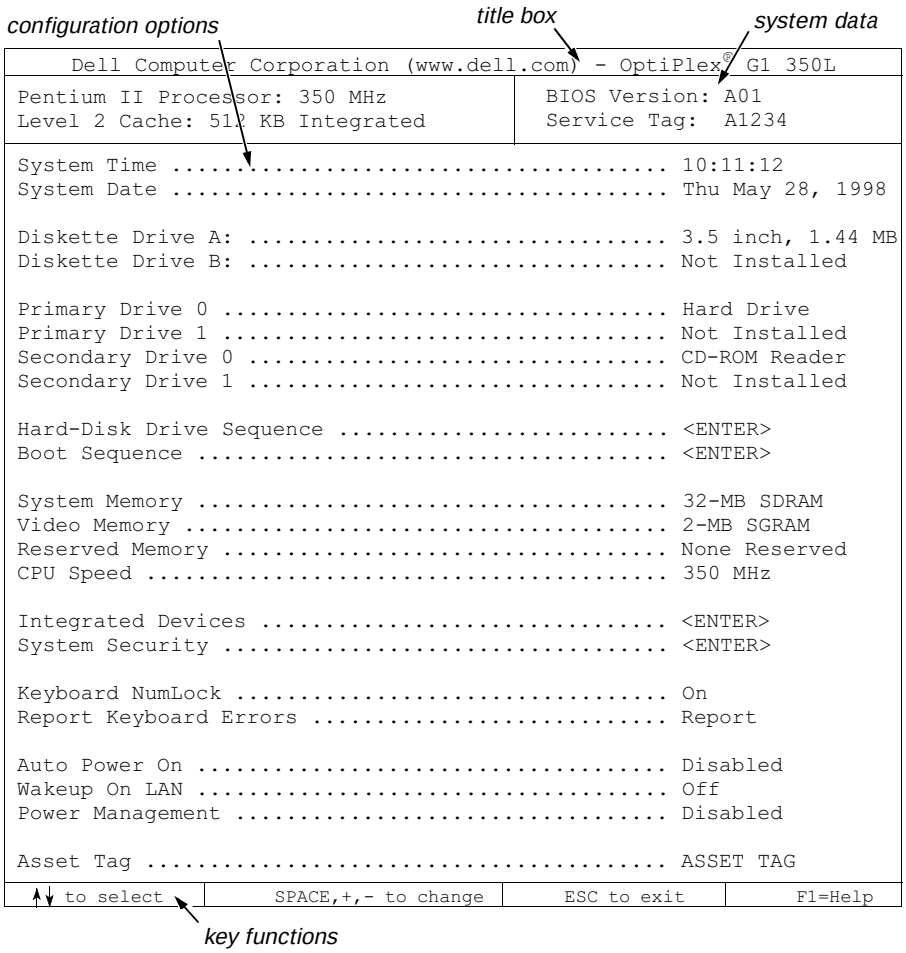

configuration options
title box
system data
Dell Computer Corporation (www.dell.com) - OptiPlex® G1 350L
Pentium II Processor: 350 MHz
Level 2 Cache: 512 KB Integrated
BIOS Version: A01
Service Tag: A1234
System Time 10:11:12
System Date ..... Thu May 28, 1998
Diskette Drive A: ..... 3.5 inch, 1.44 MB
Diskette Drive B: ..... Not Installed
Primary Drive 0 ..... Hard Drive
Primary Drive 1 ..... Not Installed
Secondary Drive 0 ..... CD-ROM Reader
Secondary Drive 1 ..... Not Installed
Hard-Disk Drive Sequence ..... <ENTER>
Boot Sequence ..... <ENTER>
System Memory ..... 32-MB SDRAM
Video Memory ..... 2-MB SGRAM
Reserved Memory ..... None Reserved
CPU Speed ..... 350 MHz
Integrated Devices ..... <ENTER>
System Security ..... <ENTER>
Keyboard NumLock ..... On
Report Keyboard Errors ..... Report
Auto Power On ..... Disabled
Wakeup On LAN ..... Off
Power Management ..... Disabled
Asset Tag ..... ASSET TAG
↑↓ to select
SPACE,+,- to change
ESC to exit
F1=Help
key functions

Figure A-1. System Setup Screen

Table A-1. System Setup Options

Option	Function
System Time	Resets time on computer's internal clock.
System Date	Resets date on computer's internal calendar.
Diskette Drive A Diskette Drive B	Identifies type of diskette drives installed. Options always match physical locations of drives in computer. Tape drives are *not* reflected in these options.
Primary Drive *n* Secondary Drive *n*	Identifies drives attached to the IDE1 and IDE2 connectors on system board. Each EIDE connector supports two EIDE drives (Drive 0 and Drive 1). For EIDE hard-disk drives, the system provides an automatic drive-type detect feature. To use this feature, highlight the appropriate Drive option, press <Enter>, and then type a (for *automatic*). If none of the supported drive types matches the parameters of the new drive, enter parameters directly. To do so, highlight the appropriate Drive option (Drive 0 or Drive 1), press <Enter>, and then type u to display `User1`. Press <Tab> to highlight each of the parameter fields in succession, and enter the appropriate number for each field. *NOTE: For EIDE devices such as EIDE CD-ROM drives and EIDE tape drives that are using the built-in EIDE controller, set the appropriate Drive option to Auto.*
Hard-Disk Drive Sequence	Lists installed adapter cards and devices in the order they will be initialized.
Boot Sequence	Lists the order of the devices from which the system attempts to boot.
System Memory	Indicates the entire amount of installed memory detected in your system.
Video Memory	Displays the amount of video memory detected in your system.
Reserved Memory	Designates a region of system board memory that can be supplied by an expansion card. This feature should not be enabled unless an expansion card that requires special addressing is installed.
CPU Speed	Indicates processor speed at which system boots—the processor's rated speed or a slower compatibility speed, which disables cache.

Table A-1. System Setup Options

Option	Function
Integrated Devices	Configures the devices integrated into the system board.
System Security	Displays the current status of your system's password security feature and allows you to assign and verify a new password.
Keyboard NumLock	Determines whether the system boots with the keyboard's Num Lock mode activated.
Report Keyboard Errors	Enables or disables reporting of keyboard errors during POST.
Auto Power On	Allows you to set the day and time you want the system to power on automatically. The time uses the 24-hour format.
Wakeup On LAN	Wakeup On LAN determines whether the Wakeup On LAN feature is set to Off or On. You must reboot your system before a change takes effect. *NOTE: A Wakeup On LAN-capable NIC must be installed to use this functionality.*
Power Management	With the Power Management option enabled, DPMS monitors and most EIDE drives automatically switch into low-power mode during periods of system inactivity. **CAUTION: Before enabling this feature, check the monitor documentation to make sure that the system has a DPMS-compliant monitor. Otherwise, there is a risk of damaging the monitor.** *NOTE: Not all EIDE hard-disk drives support this feature. Enabling this feature for a drive that does not support it may cause the EIDE drive to become inoperable until the system is restarted and the Power Management option is disabled.*
Asset Tag	Displays the customer-programmable asset tag number for the system if an asset tag number has been assigned.

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